DOCUMENT RESUME

ED 142 108 HE 009 086

AUTHOR	Coutu, A. J.; Jones, E. Walton
TITLE	Review and Analysis of Sponsored Research at the University of North Carolina.
INSTITUTION	North Carolina Univ., Chapel Hill.
SPONS AGENCY	National Science Foundation, Washington, D.C.
PUB DATE	Sep 75
NOTE	133p.
AVAILABLE FROM	General Administration, The University of North Carolina, P.O. Box 2688, Chapel Hill, N.C. 27514
EDRS PRICE	MF-$0.83 HC-$7.35 Plus Postage.
DESCRIPTORS	*Administrative Policy; Classification; Educational Administration; Educational Economics; *Research; Research Projects; *School Accounting; *State Universities; *University Administration
IDENTIFIERS	*Research Administration; *University of North Carolina

ABSTRACT

Reported is a study of research programs within the University of North Carolina that provided the basic information needed in the preparation of an official policies and procedures statement. Contents include: (1) an inventory of research being conducted; (2) an assessment of various classification schemes for accounting and reporting the research programs; (3) an analysis of several substantive issues of current interest relating to research administration within universities in general; (4) an analysis and recommendations relating to the administration of overhead policies and procedures; and (5) a set of general recommendations relating to research administration that are applicable at any university. (Author/MSE)

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REVIEW AND ANALYSIS OF SPONSORED RESEARCH AT THE UNIVERSITY OF NORTH CAROLINA

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The University of North Carolina
Chapel Hill, North Carolina

Under a Grant from the
National Science Foundation

September 1975

William A. Dees, *Chairman*
Board of Governors

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President

The University of North Carolina
General Administration
P. O. Box 2688
910 Raleigh Road
Chapel Hill, North Carolina
27514

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REVIEW AND ANALYSIS OF SPONSORED RESEARCH AT THE UNIVERSITY OF NORTH CAROLINA

A. J. Coutu
in cooperation with
E. Walton Jones

The University of North Carolina
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Under a Grant from the
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E. Walton Jones*

and

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PREFACE

This document is not a policy statement on research management within The University of North Carolina. It is a report on a study of research programs within The UNC which provided the basic information needed in the preparation of an official policies and procedures statement.

The Study that is reported here was generously supported by the National Science Foundation. It was justified from the standpoint of its potential usefulness in National Science policy formation in addition to improving research administration within universities.

The basic information contained in this report includes:

(1) An inventory of research being conducted within The University of North Carolina

(2) An assessment of various classification schemes for accounting and reporting the research programs of The University

(3) An analysis of several substantive issues of current interest relating to research administration within universities in general

(4) An analysis and recommendations relating to the administration of overhead policies and procedures

(5) A set of general recommendations relating to research administration which are applicable to any university.

The recommendations for research administration and management as contained in this report are those of the principal investigator with due consideration to the inputs of a technical advisory committee. In making these recommendations, the investigator also considered comments from officials of The University General Administration.

It is emphasized that this is a research document which is the sole responsibility of the Principal Investigator. The document contains a report of his findings. It does not bind The University or anyone else to follow any of the recommendations or suggestions that it contains.

The area of research administration or management is highly controversial. It is an area, however, where considerable attention is being directed at the present time at all levels of government. This Study should be of interest to all who have responsibilities in this area of university administration.

E. Walton Jones

LIST OF ACRONYMS AND ABBREVIATIONS

For purposes of brevity, the following frequently used names appear throughout this report as acronyms:

NSF -- The National Science Foundation

The UNC -- The University of North Carolina made up of 16 institutions

The University -- The University of North Carolina

UNC-GA -- The University of North Carolina-General Administration

ASU	- Appalachian State University	PSU	- Pembroke State University
ECU	- East Carolina University	UNC-A	- University of North Carolina at Asheville
ECSU	- Elizabeth City State University	UNC-CH	- University of North Carolina at Chapel Hill
FSU	- Fayetteville State University	UNC-C	- University of North Carolina at Charlotte
NCA&T	- North Carolina Agricultural and Technical State University	UNC-G	- University of North Carolina at Greensboro
NCCU	- North Carolina Central University	UNC-W	- University of North Carolina at Wilmington
NCSA	- North Carolina School of the Arts	WCU	- Western Carolina University
NCSU	- North Carolina State University	WSSU	- Winston-Salem State University

INTRODUCTION AND SUMMARY

Organized research is a set of human activities designed to discover knowledge with the goal that it will be transformed into more effective means to accomplish social ends. Research has emerged over the last fifteen years as a major economic sector within the United States--total expenditures in 1974 were four times the level in the late 1950's. Some estimate that the total knowledge industry, including organized research, accounts for nearly one-half of the increase in national income since 1930.

Research expenditures at United States universities represent about 10 percent of the nation's $30 billion in research and development. Within The UNC the research component represents about 16 percent of the total University expenditures or some $50 million per year.

With growth in the research sector, some uncertainties over the retrenchment attitude, concern over the public's lack of knowledge of the research role and its benefits, and a general concern for efficiency in the use of research resources, the management role in research has been emphasized. An NSF program now entering its third year, has been developed to analyze alternatives for research management improvement. This study of sponsored research at The UNC is a part of the NSF program.

The overall purpose of the present study encompassing the sixteen institutions in The UNC was to make more explicit the role, scope, structure, and decision processes of research management. The focus on research management, in a relatively new University system, was designed to enhance growth of the research mission, to improve its management and to reveal possible efficiencies in the use of scarce federal research resources. More explicitly, this

necessarily descriptive, Phase One effort at research management in The UNC was directed at:

1. Determining the extent of research throughout The UNC.
2. Development of research classification systems to assess the scope and balance of research.
3. Development of the initial elements of a system of research management encompassing the planning, implementation and evaluation of research activities.

Research management is conceived as a process involving problem identification, analysis of alternatives, decision-making, implementation, and evaluation of resultant actions. As such, research management involves the review and approval of proposals; project and research program coordination; structural changes in research organizations; implementation issues of personnel, facilities and equipment, publications, and overhead; as well as issues of monitoring and evaluation relating to contract obligations, complementarity to other university missions of resident instruction and public service, and balanced participation in state and national research programs.

The rationale that has guided this assessment of research management can be summarized as follows:

1. That no single effort could produce a research management system -- this initial effort was considered a Phase One effort of a continuing process of research management improvement.

2. That no objective, usually quantitative, set of criteria now exists nor will emerge in the near future to logically order The University research

program relating to issues of priorities, coordination, structure and control--rather the effort was to understand where we are now, on what basis allocation decisions are made and to seek improvements in that basis.

3. That the goals of a central research management system (the general administrative unit of The UNC) be directed at improving the environment for individual researcher initiatives, preserving the autonomy of research decision processes at respective UNC institutions and be catalytic to interinstitutional research opportunities.

The results of this initial effort on research management are summarized in the six general recommendations discussed below:

1. That research administrators at all levels of The UNC increase their participation in the development of The University's research rationale and participation in the formulation of state, regional and national science and research policy. There needs to be a more clearly reasoned and established state, regional and national policy concerning the functions, role and support of the joint products of university research--new knowledge and graduate education. A major need is to help shape science policy by rendering to the public information on the necessary role of research, the benefits of research, alternatives to overcome structural issues in research organizations; clarifying the role that universities are suited to play;and being the advocate of the research mission of The University.

2. That a decentralized research management system be established. The basic elements of the system are:

   a. That a common set of research policies and procedures be accepted and implemented at each institution with a monitoring role by The UNC-GA.

b. That an expanded informational system be developed to enhance intra and interinstitutional coordination.

c. That enhanced research coordination be the charge of interinstitutional research councils structured by The UNC-GA.

d. All sponsored research proposals originating at the department, interschool or intrainstitutional institute level be reviewed and approved at the originating institution.

e. All sponsored research proposals originating at the interinstitutional level be reviewed and approved at the individual institutional level and at The UNC-GA.

f. That periodic evaluations of all inter and intrainstitutional research institutes be conducted.

g. That The UNC-GA continue a program on research management in support of issues on policies and procedures, organizational structure, priorities, coordination and opportunities.

3. That a research accountability program be initiated. The general public, government administrators and many in The University community are poorly informed on the functions and results of two closely linked societal establishments; namely, the research and graduate training programs.

Further, effective coordination of research projects and programs will likely only be achieved through an enhanced informational system. Such a system should describe research program objectives, research results, interdisciplinary organizational structures; produce an inventory of research talent; and serve to link researchers with similar interests and motivations.

As research is a highly individualistic enterprise increasingly more

specialized and one that abhors hierarchal structures, mandatory coordination cannot be imposed. The proposed informational system can favorably impact research productivity given talented and motivated researchers supported by adequate facilities and equipment to conduct research.

4. That continual stocktaking of the scope, function and impact of inter and intrainstitutional research institutes be an integral element of university research policy. The number of research institutes (centers, programs, and consortia) has almost doubled between 1968 and 1974 and now account for more than 50 percent of the total expenditures on sponsored research.

A set of policies and procedures are suggested on issues of chartering-dechartering, proposal review and approval, interinstitutional coordination, minimizing of departmental and institute conflicts, and evaluation. Other recommendations are suggested on issues of:

a. The greater linkage of The University research personnel with public and private decision makers concerned with new or revised developmental policies.

b. The nominal amount of inter and multiple disciplinary involvement in institutes.

c. The limited number of graduate students involved with institute research programs.

d. The relatively large number of non-academic appointments associated with research institutes.

5. That a set of actions be initiated to improve indirect cost rate proposals and to improve policies that guide the redistribution of overhead recoveries. In the two major research institutions in The UNC and likely in

others with an increasing level of research activity, there are opportunities to achieve more complete coverage of the indirect costs of research.

In rate proposal preparation and negotiations, inadequate supporting and documentation studies exist to effectively utilize accounting system data. These inadequacies relate to building use, equipment control, activity reports on administrative personnel, effort and time reports of plant maintenance functions, and library use documentations.

There are two major problems related to the redistribution of overhead recoveries. A lack of knowledge of current policies and practices that can be resolved with an improved information system. Secondly, a general understanding that indirect cost receipts are used for purposes other than to reimburse the cost pools used in indirect cost rate determinations. Improvements in supporting studies and documentations used in conjunction with accounting data detail provide the necessary data base for changes in redistribution policies.

6. That The UNC-GA research office concentrate on research policy formulation, development of an informational system, and on experimentation in research management. The suggested information system would have three components -- (1) an annual accountability report, (2) periodic newsletters on inter and intra-institutional research institute activities and (3) special reports on research policies and procedures, long-range research planning and the results of research management studies of indirect costs, publication alternatives and efficiencies in equipment utilization, etc.

The areas for continued experimentation in research management are:

a. Development of a program to assess alternatives for spatial

allocation of research activities relating to issues of economies to size, program complementarities and research resource use efficiency.

b. Further development of a research management system relating to the functions, administration and organization of research institutes.

c. Further development of more objective measures of research productivity.

d. Further development of alternatives to enhance policy formulation relating to indirect costs.

e. Further development of alternatives relating to research policy formulation at state, regional and national levels.

Section I: RESEARCH AT THE UNIVERSITY OF NORTH CAROLINA: AN OVERVIEW

Throughout the last decade, the research sector of The UNC, the state, and the nation has been expanding. Rates of growth appear to be slowing down but absolute levels are still large. The overview is presented to review these changes by describing financial resources used in research, the quantity of associated human resources and sources of research support.

The broad spectrum of the U.S. sponsored research sector is presented to emphasize that The UNC is a component of a large community of research participants. At the state and national level the research and development community includes some 525,000 scientists and engineers with two-thirds associated with private U.S. industry, slightly more than a fourth equally divided between the federal government and U.S. universities, and the balance associated with private nonprofit and state institutions. The composition of this science community over the decade has changed with the structuring of jointly administered federal/university research laboratories and centers, federal/private industry laboratories, and the expansion of multiple disciplinary institutes and centers at universities and quasi-public nonprofit research institutes.

A unique aspect of the university component of this large research community is its role in the output of new scientists. Unlike the other entities that make up this community, the joint product of new knowledge and trained scientists is primarily a university function.

Prior to describing the characteristics of the national community and then The UNC research program, it is essential to clarify the boundaries of university research. In this assessment of research at the 16 institutions of The UNC, we distinguish sponsored from unsponsored or what is commonly called scholarly efforts, departmental research or unsponsored inquiry.

Sponsored research includes all forms of organized inquiry that are separately budgeted within the financial system of The University. Further, sponsored research includes a sequence of knowledge seeking activities that range from basic to adaptive with the latter subclassified into applied and developmental. Basic research is studious inquiry and experimentation that seeks principles and relationships underlying new knowledge. Applied research further crystallizes the true nature of knowledge and demonstrates the practical application through bench mark approaches and commercial orientation. This phase includes the clinical aspects of medical research that further explore new conceptualizations by involving humans in diagnostic and treatment related studies. Most experimental research designs in engineering and agriculture that extend new knowledge fall in this phase.

The developmental phase of research reduces knowledge to practice in workable prototype form. This latter phase involves the systematic use of knowledge in the production of useful materials, devices, designs and processes.

Most forms of sponsored research at The UNC include two types of output. One is the output of new knowledge throughout the sequence and the training of future human research resources. Most sponsored research activities will include provisions for the conduct of the research and training, However, all training grants and contracts to The UNC do not include research.

Unsponsored research or that not separately budgeted is not included in this review. Various forms of self-motivated scholarly activity are unsponsored along with professional time associated with the preparation of research proposals seeking a sponsored status, preparation of new and revised books, participation in the accreditation of new knowledge through the refereeing process, and other forms of participation in the dissemination of knowledge.

National Overview

Throughout the period 1962 to 1972, the level of national effort in research and development has increased from $14.6 to 28.9 billion expressed in current dollars. The research component including basic and applied activities accounted for slightly more than one-third of the national effort (see Table 1.1). The university share of the basic and applied research excluding development over the period ranged from $.9 to 2.63 billion or at slightly more than one-fourth of total research.

Table 1.1: National Research and Development Expenditures in Current Dollars for Selected Years

Year	Total	Total for Research	Total for Development	Total University Research
		(billion dollars)		
1962	15.67	5.7	9.97	1.1
1964	19.21	6.9	12.31	1.6
1966	22.27	7.9	14.37	2.0
1968	25.12	9.06	14.06	2.50
1970	26.70	9.65	17.05	2.59
1971	27.32	10.00	17.32	2.63
1972	28.94	-	-	-

Source: National Science Board, "Science Indicators, 1972," NSF 1973 and Carnegie Commission Report, The Home of Science, D. Wolfle, Carnegie Commission Series, 1972.

Total expenditures for national research and development have increased, in current dollars, throughout the ten-year period. However, adjusting for inflationary conditions suggests, that real changes in the level of expenditures increased from 1962 to 1968 but have been negative since that date. The peak of

$20.8 billion for 1968 expressed in constant 1958 dollars represented a billion dollar increase over 1966 but a decline of $.8 billion in 1970 and a decline of $.7 billion in 1972 and 1973. Preliminary estimates for national research and development expenditures for 1974 are expected to show a continual decline in real terms from the high of 1968.

The federal government is the major source of research and development resources. Over the decade the distribution of expenditures by source shows a decline in the relative share by the federal government, an increase in the private industry share and a constant share by U.S. universities (see Table 1.2).

Table 1.2: Total U.S. Research and Development Expenditures by Source 1962 and 1972*

			1972	
Source	Amount (billion)	Percent	Amount (billion)	Percent
Federal Gov.	$ 9.93	63	$15.90	55
Private Industry	5.11	33	11.57	40
Univ. & Colleges	.40	3	.80	3
Non-Profit & Other	.23	1	.67	2
Total	$15.67		$28.94	

Source: National Science Board, 'Science Indicators 1972," National Science Foundation

* In current dollars.

In aggregate terms the research and development sector of the U.S. economy is not large. From a peak in 1964 of 3.1 percent of the gross national product the sector declined in 1972 to 2.5 percent. The 1972 U.S. level is exceeded by Russia with slightly more than 3 percent while U.K., France, Germany and Japan near 2.1, 1.7, 2.0 and 1.8, respectively.

Employment is another index of the magnitude of the research and development sector of the U.S. economy. According to the NSF in both 1960 and 1970 some two percent of the total civilian labor force were classified as scientists and engineers. However, only a third of these professionals were involved in research and development with only 10 to 12 percent of the active scientists and engineers doing research and development at universities as follows:

	1960	1970
	(thousands)	
Total Civilian Employment	65,800	78,600
Total Scientists & Engineers	1,260	1,700
Total Scientists & Engineers in Research & Development	410	550
Total Scientists & Engineers in Res. & Dev. at Universities	46	69

A major share of national research and developmental expenditures was devoted to applied and developmental research. Such research accounted for 85 to 88 percent of total expenditures during the decade 1962-1972. However, of the basic research expenditures of $1.8 to $2.8 billion from 1962 to 1972 the universities accounted for 45 percent in 1962 and 57 percent in 1972.

Modest change was observed throughout the decade in the functional allocation of research and development expenditures. These changes are characterized by noting shifts in the allocation of federal expenditures (see Table 1.3). National Defense and Space research received the largest allocation with health, energy and support for the advancement of science/technology the other major areas of concern. Over the decade there were modest declines in defense and space, substantial increases in support of research in transportation, economic

security and education. Federal support doubled in support of work on advancements in science and environment.

Table 1.3: Allocation of Federal Research and Development Expenditures for Selected Functions 1963 and 1972*

Function	1963 Amount (million)	1963 Percent	1972 Amount (million)	1972 Percent
National Defense & Space	$ 9,120	86	$ 8,100	74
Health	560	5	960	9
Advancement of Science and Technology	280	3	490	4
Environment	160	2	350	3
Transportation	100	1	420	4
Energy	250	2	280	3
Agriculture	130	1	200	2
Economic Security	20	-	10	1
Education	9		87	-
Total	$10,629		$10,997	

Source: National Science Board, "Service Indicators, 1972," National Science Foundation

* In constant 1958 U.S. dollars

A distinct output of university research and development programs relates to training research resources. In 1973 there were some 2,400 colleges and universities, but only 230 awarded doctorate degrees and accounted for four-fifths of all university research expenditures. In 1963 some 170 universities granting the Ph.D. awarded 8,900 such degrees and 26,000 masters degrees or 86 percent of the total master degree awards. At the end of 1972 some 230

universities granting the Ph.D. awarded 17,700 such degrees and 40,000 masters degrees or 81 percent of the total master degree awards.

However, the conventional focus of graduate education towards research and development is changing. During the period 1966 to 1971 enrollments in the medical and non-medical professional schools increased substantially more than in programs characteristic of the conventional fields of science (see Table 1.4).

Table 1.4: First Year National Enrollments for Master's and Higher Degrees, 1966, 1968 and 1971

Types of Enrollment	1966	1968	1971
Conventional Fields of Sc. (1)	96,200	101,600	100,600
Non-Medical Professional (2)	177,600	248,000	302,400
Medical Professional (3)	16,600	21,300	28,000
Other (4)	106,600	134,500	167,000
Total	397,000	505,400	598,000

Source: National Board on Graduate Education, "Doctorate Manpower Forecasts and Policy," Report No. 2, Nov. 1973.

(1) Includes engineering, physical sciences, mathematical science, life science, psychology, social science (economics, history and political science).

(2) Includes architecture and city planning, business and commerce, law and education.

(3) Includes dentistry, medicine, health professions.

(4) Includes English, philosophy and languages.

The prime source of support for university research has been the federal government followed by the universities' own resources, non-profit foundations and industry (see Table 1.5).

Expenditures on development as contrasted with basic and applied research represents about two-thirds of the national expenditures over the last decade. Estimates vary but generally the data suggest that only .5 to 1 percent of development expenditures are made by universities. The universities' concentration on basic research is supported by the following:

Year	Total expenditures for basic research	Total expenditures for basic research at universities	University proportion
	(million dollars)		(percent)
1963	$2,196	$1,036	47
1968	3,638	2,011	55
1971	3,900	2,110	54

UNC Overview

As with the national overview of research, a series of measures on expenditures, faculty, research proposals/awards and sources of support are summarized for the sixteen institutions of The UNC.

The research mission of The UNC is primarily focused on basic and applied as contrasted with developmental type activities. Total support measured by expenditures for such research has increased from $14 to 33 to 50 million for the periods 1963, 1968 and 1973.[1] As such, the size of the research mission has represented 13 to 18 percent of the total university expenditures or less

[1] The total of annual grants and contracts awarded for sponsored research in a fiscal period will exceed annual expenditures in that such awards cover multiple fiscal periods.

Table 1.5: Total Applied and Basic Research Expenditures* at Universities and Colleges by Source of Funds for Selected Years

Year	Total Expenditures (million)	Sources of Support							
		Government		Industry		Own		Other	
		Amount (million)	Percent	Amount (million)	Percent	Amount (million)	Percent	Amount (million)	Percent
1963	$1,319	$3,738	56	$39	3	$471	36	$71	5
1968	2,503	1,509	60	52	2	819	33	123	5
1971	2,625	1,480	56	74	3	935	36	136	5

Source: Carnegie Commission Report, The Home of Science, D. Wolfle, 1972

* In current dollars.

than half of the expenditures on resident instruction and generally double the level of expenditures on public service, the third major mission of The UNC (see Table 1.6).[2]

Table 1.6: Distribution of Total Expenditures by Major Missions of The UNC for 1963, 1968 and 1973

University Missions	1963 Amount (000)	1963 Percent	1968 Amount (000)	1968 Percent	1973 Amount (000)	1973 Percent
Instruction and Dept. Research	$ 31,371	31	$ 69,102	34	$120,836	42
Sponsored Research	14,145	13	33,051	16	49,667	18
Public Service	8,868	9	12,937	6	20,256	7
Other	47,646	47	90,490	44	96,715	33
Total	$102,030		$205,580		$287,474	

Source: State Audit Reports

The UNC-CH and NCSU are the major research centers within The UNC accounting for 99, 93 and 95 percent of sponsored research expenditures for 1963, 1968 and 1973, respectively. For the same dates sponsored research at institutions other than UNC-CH and NCSU increased from $145,000 to $1,531,000 to $3,537,000.

[2]The distribution of expenditures by major missions of The UNC by campus for 1963, 1968 and 1973 is shown in Appendix Tables 1 to 3.

At the end of fiscal year 1973, there were 10,200 professional employees within The UNC. Organized research constituted the primary function for 1,400 or 13 percent of the professional staff. Over a ten year period, 1964 to 1973, the total staff more than doubled as did the research component (see Table 1.7).

Table 1.7: The Distribution of Professional Employees by Primary Function in The UNC for Fiscal Years 1964, 1968 and 1973

Function	FY 1964*		FY 1968**		FY 1973**	
	No.	Percent	No.	Percent	No.	Percent
	(Full Time Equivalents)					
Resident Instruction and Dept. Research	2,884	58	4,938	62	6,525	64
Organized Research	592	12	1,336	17	1,368	13
Public Service	768	15	771	10	1,067	11
Other	688	15	893	11	1,228	12
Total	4,932		7,938		10,188	

*Source: Faculty and Other Professional Staff in Institutions of Higher Education 1963-1964, U.S. Dept. HEW, Office of Education, CE-5300-64, Circ.No. 794, 1966.

**Source: Statistical Abstract of Higher Education in North Carolina, 1969-1970, Research Report No. 1-70, Feb. 1970.

For the State of North Carolina, including private and public universities, the professional staff with research as a primary function totaled 730, 1,630 and 1,760 for the years 1964, 1968 and 1973. Private institutions accounted for less than 20 percent of the research staff in 1964 and 1968 but about 30 percent in 1973. Employment data for 1960 records 1,900 natural, biological and social scientists or some 1,500 potential research oriented professionals in state non-university employment, private industry and non-profit research organizations.

Comparable data for 1970 suggest some 2,800 potential researchers outside of universities within North Carolina. Projections for 1975 suggest annual rates of growth in excess of 7 percent for research oriented professionals in North Carolina outside of the universities.

Another indicator of the research component of The University is the scope of the advanced degree program. Throughout the previous decade, total graduate enrollment in private and public universities in N.C. increased two and one-half times. The UNC accounted for more than three-fourths of the graduate enrollment throughout the period. The data in Table 1.8 describes the distribution of graduate enrollment by type of institution over time.

Table 1.8: Distribution of Graduate Students in North Carolina Institutions of Higher Education for Fiscal Years 1962, 1968 and 1973

Type of Institution	FY 1962		FY 1968		FY 1973	
	Number	Percent	Number	Percent	Number	Percent
UNC	4,275	79	8,880	83	14,546	76
Private	1,140	21	1,845	17	4,696	24
Total	5,415		10,725		19,242	

Source: Statistical Abstract of Higher Education in North Carolina, 1972-73, Research Report No. 1-73, May 1973.

Four institutions in North Carolina, two private, awarded all Ph.D. degrees that totaled 504 and 764 in 1968 and 1972. Three private and eight public institutions awarded over 2,800 master degrees in 1968 and in 1972, with the addition of one public institution, awarded 3,890 such degrees. All first professional degrees were earned in three private and two public institutions totaling 625 and 795 in 1968 and 1972. More detail is presented in Table 1.9 on the scope of the advanced degree program.

Table 1.9: Number and Type of Advanced Degrees Awarded in the State of North Carolina by Type of Institution for Fiscal Periods 1968 and 1972

Type of Institution	First Professional		Master's		Doctor's	
	1968	1972	1968	1972	1968	1972
Private						
Duke	249	294	290	338	181	237
Wake Forest	115	148	61	75	6	6
Others	5	0	1	0	0	0
Total	369	442	352	413	187	243
Public						
NCSU	0	0	390	427	102	189
UNC-CH	249	320	897	1,324	213	316
UNC-G	0	0	198	309	2	16
ECU	0	0	271	368	0	0
NCA&T	7	0	82	132	0	0
Others	0	33	725	911	0	0
Total	256	353	2,463	3,479	317	521
Total	625	795	2,815	3,892	504	764

Within The UNC, doctorate awards in 1972 were primarily in the biological sciences, education, social sciences, physical sciences and engineering areas. Master degrees were awarded in all the major fields of science as shown in Table 1.10. As in the case of national data, the majority of professional degrees were awarded in the non-medically related areas in 1972.

Table 1.10: Number of Advanced Degrees Awarded by Fields of Science by The UNC in Fiscal Year 1972

Fields of Science	First Professional	Master's	Doctor's
Engineering	-	144	44
Physical Science	-	63	51
Environmental Sciences	-	50	4
Mathematical Sciences			
Mathematics	-	85	20
Computer Science		7	4
Life Sciences			
Biological	-	162	115
Other	125	311	13
Psychology	-	48	34
Social Sciences	-	253	86
Other Sciences*	228	2,356	150
Total	353	3,479	521

*Includes education, business & management, area studies, communications, fine and applied arts, foreign languages, home economics, law, letters, library science, public affairs and service, and interdisciplinary studies.

In 1973 more than 1,600 research and training proposals seeking sponsored status were prepared, reviewed and submitted to external funding agencies. The data in Table 1.11 describe this history since 1963 for The UNC.

Since 1968 slightly more than two-thirds of all proposals were research oriented. In the periods 1968 and 1972 almost 10 percent of the research oriented proposals involved interdepartmental or interschool coordination. The data also

Table 1.11: Number of Research and Training Proposals Submitted to External Funding Agencies and the Awards by Campus for The UNC for Fiscal Periods 1963, 1968 & 1973

Campus	Proposals			Awards		
	1963	1968	1973	1963	1968	1973
ASU	-	10	34	-	8	19
ECSU	-	2	4	-	0	0
ECU	-	114	152	-	69	143
NCA&T	6	28	99	6	19	63
NCSU	124	279	266	60	106	175
UNC-A	-	10	10	-	4	4
UNC-C	-	18	43	-	8	23
UNC-CH	452	683	860	349	465	556
UNC-G	-	23	57	-	15	38
WCU	-	25	72	-	13	44
WSSU	-	-	23	-	-	7
TOTAL	582	1,192	1,620	415	707	1,072

indicate that success rates or the ratio of awards to proposals for training and research support vary considerably across The UNC. Similar data relating to research proposals only reveal similar variations.

Another overview item concerns the sources of support for research in The UNC. More than 70 percent of the sponsored research program has been supported by federal grants and contracts since 1963. Federal support reached a peak in 1968 accounting for almost 90 percent of the total research awards.

Table 1.12: Source of Sponsored Research Support by Institutions of The UNC for Fiscal Periods 1963, 1968 and 1973

Institution	1963				1968				1973			
	Federal	State	Other[1]	Total	Federal	State	Other	Total	Federal	State	Other	Total
	(thousand dollars)				(thousand dollars)				(thousand dollars)			
ASU	-	-	-	-	2	0	0	2	1	0	101	102
ECSU	-	-	-	-	-	-	-	-	243	0	0	243
ECU	-	-	-	-	627	31	0	658	411	50	61	522
NCA&T	145	-	-	145	84	5	37	126	1,358	10	44	1,412
NCCU	-	-	-	-	-	-	-	-	334	0	20	354
NCSU	4,680	2,495	805	7,980	12,630	1,965	185	14,780	13,790	5,360	1,350	20,500
PSU	-	-	-	-	-	-	-	-	1	0	2	3
UNC-A	-	-	-	-	-	-	-	-	0	0	16	16
UNC-C	-	-	-	-	-	-	-	-	37	26	4	67
UNC-CH	5,358	120	542	6,020	15,210	-	1,530	16,740	20,910	1,620	3,100	25,630
UNC-G	-	-	-	-	740	0	1	741	318	74	96	488
UNC-W	-	-	-	-	-	-	-	-	121	22	53	196
WCU	-	-	-	-	0	4	0	4	23	16	17	56
WSSU	-	-	-	-	-	-	-	-	65	0	13	78
Total	10,183	2,615	1,347	14,145	29,293	2,005	1,753	33,051	37,612	7,178	4,877	49,667
Percent	72	18	10	100	89	6	5	100	75	15	10	100

Source: NSF Survey of Scientific Activities of Institutions of Higher Education and informal survey data.

[1] This category includes funds from private individuals and firms, overhead receipts and other sources within The University.

As noted in Table 1.12, the State of North Carolina provided eighteen percent of the research awards in 1963, only 6 percent in 1968 and fifteen percent in 1973. Other sources of support including gifts and grants from private individuals and firms plus The University's own resources account for 10 percent of the program in 1973.

Over the period 1964 to 1973 medical research at UNC-CH has been the major recipient of federal support. Since 1970 federal support for multiple disciplinary, social science and education research, classified as other in Table 1.13, has exceeded such support for agriculture and engineering at NCSU and UNC-CH.

The data in Table 1.13 also show absolute declines in federal support to agriculture and engineering along with modest changes in medical and other areas when account is taken of inflation.

Table 1.13: Changes in Federal Research Support by Type of Research for NCSU and UNC-CH for Selected Fiscal Years*

Fiscal Year	Type of Research				
	Medical	Agricultural	Engineering	Other	Total
	(thousand dollars)				
1964	3,717	3,127	539	3,216	10,599
1966	5,530	6,592	1,011	4,117	17,250
1968	9,796	6,452	2,962	8,630	27,840
1970	12,160	5,959	2,768	8,913	29,818
1972	10,575	6,111	2,047	8,329	27,062
1973	15,124	5,575	1,561	12,440	34,700

Source: NSF Survey of Scientific Activities of Institutions of Higher Education and informal survey data

* in current dollars.

Within the overall funding of The UNC research program, a small quantity of resources are structured as special faculty research grants. These awards are usually administered by the institution's research committee. Generally the intent is to serve as a stimulus to the development of a sponsored research proposal. Other purposes for the awards include released time, finalizing of a research manuscript, conduct of workshops and seminars to develop or disseminate research results and special travel relating to research activities.

Further, the awards of $800 to $1200 are generally made to staff members in the social sciences, arts and humanities and selected physical sciences where sponsored research grants and contracts are more difficult to obtain. For two fiscal periods the resources were allocated as follows:

Type of research	1968	1973
	(thousand dollars)	
Medical	16	37
Agriculture	57	60
Engineering	17	47
Social Sciences	301	242
Arts & Humanities	30	35
Other	57	61
Total	478	482

A majority of the special faculty research grants are allocated at NCSU, and UNC-CH (see Table 1.14).

Table 1.14: Distribution of the Number and Amount of Special Faculty Research Grants by Institutions in The UNC for Fiscal Periods 1968 and 1973

Institution	1968		1973	
	Number	Amount	Number	Amount
		(thousand dollars)		(thousand dollars)
ECU	7	5	8	5
NCA&T	3	6	6	9
NCCU	9	2	10	3
NCSU	45	113	50	137
UNC-A	-	-	1	3
UNC-C	23	26	37	34
UNC-CH	240	291	356	243
UNC-G	57	30	90	33
UNC-W	6	5	9	8
WCU	-	-	10	7
Total	390	478	577	482

Source: Survey of UNC institutions.

As is the case for the total research budget, the federal government is the major source of support for special faculty research grants. The data summarized below describe the sources of support:

Source	1968	1973
	(thousand dollars)	
Federal	282	256
State	120	130
Other	76	96
Total	478	482

Section II: CLASSIFICATION OF RESEARCH ACTIVITIES

A major objective of the study on research management was to develop a logical system for classifying research in The UNC. There were three basic purposes:

1. To provide a systematic framework for reporting on the scope and balance of research activities--reporting to the general public and public decision makers, and to the research community within The UNC. The reports to the general public will hopefully assist in their decisions in formulating research policy. The reports to The UNC faculty will hopefully enhance coordination and efficient use of scarce research resources.

2. To develop the basis for a retrieval system designed to assist in the planning and evaluation functions of research management -- such data are a necessary element in deciding issues of the roles, responsibilities and areas of cooperation for respective institutions in The UNC.

3. To develop systems that would assist decision makers in identifying research opportunities and in commissioning evaluations relating to needed changes in the research program.

Other purposes for the research classification system were as a bench mark for continual stock taking of the research mission, for assessment of balance within the program, and as a phase of a continual effort to improve capacities to assess research productivity. Another purpose was for compatibility with more aggregate classification systems--at the state level including research at private, non-profit and other public institutions; and at the regional and national level.

A series of conditioning factors were considered in developing classification systems. One related to a desire to be able to duplicate so that varying levels

of aggregation or disaggregation could be readily achieved by different administrators. Also, the classification system should lend itself to computerization. The classifications proposed relate to large program aggregates and are presented as guides to research decision processes that necessarily include many subjective and uncertain elements. This condition should dispel the concern of most scientists that the classifications are directed towards cost-benefit estimation procedures for choosing priorities.

Given these purposes and conditioning elements, the classification systems have been designed for two audiences. The first relates to the nonscience community of the general public and their legislative representatives concerned with science policy and the assessment of technology changes on societal goals. For this audience The UNC research program has been classified by problem areas and into broad aggregates by types of research. A second audience is that of the research community within The UNC. To assist in program coordination and to minimize unnecessary duplication, the research classifications concentrate on assessing balance by fields of science and basic sources of societal changes resulting from research.

Because of the individuality of research, its unpredictability, and the apparent difficulties of force-fitting it into more functional organizational structures, any classification system is highly subjective. Greater objectivity is dependent upon reliable measures of research productivity or output. No systematic effort has been made to weigh and index the measures of research output that include publications, citations, patents, trained personnel, staff honors for intellectual contributions, and the impact on the quality of resident instruction.

The research classification systems presented in this section have been

developed from a data base that included detailed compilations of all UNC research projects, questionnaires directed at all inter and intrainstitutional research institute directors, and secondary sources at the state, regional and national level.

Overall Research Program in 1973

Sponsored research expenditures throughout The UNC totaled over $47 million in 1973. This total can be allocated as follows:

Research conducted by Institutes - $27.2 million

Research conducted by Disciplines- $20.4 million

This expenditure for sponsored research included some 2,100 projects with an almost equal division between departments and research institutes. More detail on the number of projects and sponsored research expenditures in 1973 are shown in Table 2.1.

Preliminary data from four UNC institutions estimated the quantity of unsponsored departmental research in 1973 at $2 million. A detailed study would be required to determine the quantity of research activity that is annually conducted under the budget item of resident instruction and departmental research.

Alternative Classification Systems

A total of six classification systems have been developed in an attempt to characterize the research program of The UNC. They are by type of audience the following:

General public

1. Functional research areas
2. Major societal issues
3. Problem areas

Table 2.1: Distribution of Sponsored Research Projects and Research Expenditures by Institutions in The UNC for Fiscal Year 1973*

Institution	Discipline Research		Inter & Intra Institute Research		Total	
	Projects (number)	Amount (000)	Projects (number)	Amount (000)	Projects (number)	Amount (000)
ASU	10	$ 102	0	$ 0	10	$ 102
ECSU	3	161	0	0	3	161
ECU	60	521	3	76	63	597
NCA&T	25	240	23	290	48	530
NCCU	7	266	11	200	18	466
NCSU	158	5,870	501	14,900	659	20,770
PSU	1	3	0	0	1	3
UNC-A	1	16	0	0	1	16
UNC-C	20	53	4	12	24	65
UNC-CH	697	12,468	479	11,117	1,176	23,585
UNC-G	22	488	0	0	22	488
UNC-W	3	61	11	476	14	537
WCU	15	61	41	85	56	146
WSSU	3	78	0	0	3	78
Total	1,025	$20,388	1,073	$27,156	2,098	$47,544

*Differences in total expenditures are primarily the result of procedural differences in annualizing multiple period research grants and contracts.

Research community of The UNC

1. Field of science
2. Societal change
3. Research institutes

For each classification system the subsequent discussion presents research expenditures for fiscal 1973, definitions of categories, and general implications of the specific system.

Functional Classification:

Within The UNC more than 59 percent of the 1973 research program focused on health, agricultural and engineering problems. Health related research accounted for 29 percent of the total program and involved researchers at seven of the sixteen institutions (UNC-CH, ECU, UNC-G, NCA&T, WSSU, NCCU and UNC-C). Agricultural research was underway at three locations (NCSU, NCA&T and UNC-G) and accounted for 26 percent of the total program. Engineering research was also active at three locations (NCSU, NCA&T and UNC-C) accounting for almost 4 percent of the total program (see Table 2.2).

Within these major functional areas of health, agriculture and engineering the research was subclassified into categories of basic, experimental and developmental. Each subcategory was defined as follows:

Basic research--increases in knowledge either in new judgments which lead to an increase in understanding of subject and/or increases in theoretical knowledge relating to innovation and policy formulation.

Experimental research--practical application of knowledge with specified commercial orientation, including clinical research in health related areas or in general, the second stage extending of new knowledge relationships beyond the

Table 2.2: Expenditures by Functional Classification of Research in The University of North Carolina for Fiscal Year 1973

Classes of Research		Health Related (000)	Agricult'l. Rel'd (000)	Engineer'g Rel't (000)	Total (000)
Basic Research Focus:		$ 7,657	$ 1,019	$ 342	$ 9,018
Experimental Research Focus:		1,925	8,126	976	11,027
Developmental Research Focus					
Health	Community & Health Care Systems	2,682			4,423
	Environmental	469			
	Epidemiology	486			
	Other	786			
Agric.	Production		1,059		3,173
	Markets & Trade		805		
	Societal Problems		1,149		
	Other		160		
Eng.	Design			144	538
	Process/system			204	
	Product			190	
Total		$14,005	$12,318	$1,856	$28,179

initial conceptualization.

Developmental research--systematic use of scientific knowledge in the production of useful materials, devices, and methods including the design and development of prototypes and processes.

Other research--research conducted in multiple disciplinary groups usually experimental and developmental in character.

Within the health, agriculture and engineering areas, the research program at UNC was divided as follows in 1973:

Basic Research	- 32 percent
Experimental Research	- 39 percent
Developmental Research	- 29 percent

Major Societal Issues:

There appears to be reasonable consensus in the research community that there are three basic sources of change in society. The three are changes resulting from technical and biological innovations, the quality of human resources, and from institutional changes within which man and his technical/biological and social processes operate. This section disaggregates these three sources of change into six broad categories hopefully more compatible with society's view of important components of their total environment. The six societal areas are defined as follows:

1. Industrial--includes all basic, applied, and developmental research focusing on mechanical, biological and social technologies that relate to production efficiency where the private sector or market forces as contrasted with government decision processes dominate. Such technologies include research directed at science based industries (medical equipment, optics, non-fossil fuels, polymers, chemicals), directed at low technology industries (textiles, food

processing, construction, furniture, paper, food and related products), and to service industries (financial, insurance, retail).

2. Human Resource Development--includes all research relating to knowledge of human relationships with emphasis on the individual as contrasted to social processes. Included is medical and public health research on physical and mental issues, educational research on the learning process, psychology research on meaning and motivation, and research on human nutrition and labor productivity.

3. Conservation and Utilization of Natural Resources--includes all research relating to the use and conservation of land, water, and air excluding direct industrial type technologies and institutional or governmental processes. Included is research on agricultural productivity, environmental standards, marine ecology, land use alternatives, conservation systems, as well as fossil-fuels and stock resources.

4. Amelioration of Social Problems--includes all research relating to knowledge on the quality of life, social conflict and social alienation. Included is research on changing values, discrimination, parameters of family size, health and educational delivery systems, formal and non-formal educational technologies, sources of crime and transport casualties. Further, this subclass includes knowledge on major issues of group conflict, disrespect for established institutions, restraints on cross cultural integration, causes of poverty, optimum size of urban entities, and knowledge of trade-offs on individual incentives and societal priorities.

5. Governmental Processes--includes all research relating to innovations and policy formulations where legislative and judicial not market allocation and distribution processes operate. The processes extend from local, regional, state, and national to international governments and could encompass laws that restructure

institutions, that affect income distribution, and that relate to economic and social planning. Also, research on those issues that relate to major problems such as the public responsibilities for defense, employment and economic stability; to lack of an innovative public sector; to changes in the U.S. international position; and to the resolution of international conflicts.

6. Other--all other research at The UNC.

The data in Table 2.3 on expenditures in fiscal 1973 describe the distribution of research at thirteen institutions classified by major societal problems. All problem areas are receiving some attention but investments in human resource development were three times that in other classes of research. Aside from human resource development, The UNC institutions other than NCSU and UNC-CH are devoting more resources to social and governmental issues than any other class of research.

Priority Problem Areas:

A series of state and national seminars and workshops have assessed opportunities for research in terms of priority problem areas. The problem areas have been established by cumulating opinions of scientists on what areas research can make substantial contributions and to NSF efforts to bring qualitative judgments into the difficult question of research allocations at the national level.

A collation of these efforts results in a classification system of nine priority problem areas. The areas and definitions are:

1. Advancement of Science and Technology--includes all basic research not allocable by problem area and that directed at theoretical and methodological issues.

2. Agricultural Productivity--includes all agriculturally oriented research directed at increasing the quantity and quality of agricultural products and

Table 2.3: Distribution of Total Sponsored Research Expenditures by Institutions Classified by Type of Societal Issues for The UNC for Fiscal Period 1973

Institution	Industrial-ization	Human Resource Development	Conservation & Utilization of Nat. Resources	Social Issues	Government Processes	Other	Total
			(thousand dollars)				
ASU	0	40	0	10	0	52	102
ECSU	0	30	0	11	0	120	161
ECU	68	291	204	2	32	0	597
NCA&T	168	54	51	163	88	6	530
NCCU	82	104	16	199	58	7	466
NCSA	0	0	0	0	0	0	0
NCSU	4,546	2,097	10,941	1,856	164	1,166	20,770
PSU	0	0	0	0	0	3	3
UNC-A	16	0	0	0	0	0	16
UNC-C	6	21	3	6	29	0	65
UNC-CH	1,381	16,564	1,244	2,543	478	1,375	23,585
UNC-G	29	342	0	77	40	0	488
UNC-W	0	4	462	0	0	71	537
WCU	5	43	0	90	8	0	146
WSSU	8	0	0	70	0	0	78
Total	6,309	19,590	12,921	5,027	897	2,800	47,544
Percent	13	41	27	10	2	7	100

expanding the utilization of agricultural resources.

3. Energy Conversion and Development--includes all research that relates to nuclear energy capabilities, development of non-nuclear energy sources, utilization and rationing of energy and research on international energy policies.

4. Transportation--includes all research on the transport of people and things over all modes of transportation such as air, surface and water as well as multi-modal transport technologies and systems; transport safety and law enforcement; regulatory standards; national and international contracts and agreements.

5. Industrial Productivity--includes all industrial research such as new machine technologies, industrial processes, medical oriented diagnostic machine designs and processes, agricultural production machine technologies, processing technologies for food products and similar technologies designed to increase productivity and expand resource utilization.

6. Health--includes all medical research relating to innovation and policy formulation such as that directed at prevention and control of health issues, medical delivery systems, drug abuse and abatement, population regulation, impacts of medical service programs and development of health related resources.

7. Environment--includes all environment research directed at pollution control and abatement, resource monitoring and forecasting, cycling systems, international interdependencies, and public versus private resource management alternatives.

8. Socio-economic Security--includes all micro and macro socioeconomic research directed at amelioration of poverty involving direct or indirect income distribution processes; regional, national, and international trade; manpower resource development; and factor and product price policy and regulation.

9. Education--includes all educational oriented research directed at enhancing

the learning process, development of improved curriculum, educational motivation, and changes in instructional processes.

This broad and less technical classification suggests the substantial scope of the research mosaic of The UNC, but a substantial lack of balance in the total program. As shown in Table 2.4, there may be opportunities in the important problem areas encompassing energy conversion, transportation, agricultural and industrial productivity. As in other classifications, health research is dominant with more than two-fifths of the total expenditures, followed by research in the advancement of science, with a relatively favorable share of research on environment, education and socioeconomic issues.

The percent distribution of UNC research expenditures by problem areas for 1973 as contrasted with a similar classification of federal research and development expenditures in 1972 was as follows:[3]

	Federal	UNC
	(percent)	
Advancement Science & Technology	16.2	12.0
Agricultural Productivity	6.6	19.0
Energy Conversion	9.3	1.0
Transportation	13.9	2.0
Health	32.0	33.0
Environment	11.7	8.0
Socioeconomic Security	3.5	8.0
Education	2.9	5.0
Other	3.9	12.0

This comparison with federal allocations suggests opportunities may exist for

[3]Comparisons are with a $16.0 billion federal research and development expenditure in 1972 excluding $11.6 billion on defense and space.

Table 2.4: Distribution of Sponsored Research Expenditures by Priority Problem Areas by Institutions within The UNC for Fiscal Period 1973

UNC Institutions	Advancement Science & Technology	Agricultural Productivity	Energy Conversion	Transportation	Industrial Productivity	Health	Environment	Socio-Economic Security	Education	Other	Total
					(thousand dollars)						
ASU								10	40	52	102
ECSU									41	120	161
ECU	206					127	131	16	22	95	597
NCA&T	14			100	67	78	70	192	3	6	530
NCCU						194			269	3	466
NCSU	2,416	8,926	263	278	2,126	434	2,300	2,153	648	1,226	20,770
PSU	3										3
UNC-A	16										16
UNC-C	17					11	19	9	3	6	65
UNC-CH	2,482		25	541	143	14,560	1,140	1,501	1,251	1,942	23,585
UNC-G	39					170			249	30	488
UNC-W	418						119				537
WCU	11					37		85	5	8	146
WSSU	8					65		5			78
Total	5,630	8,926	288	919	2,336	15,676	3,779	3,971	2,531	3,488	47,544
Percent	12	19	1	2	5	33	8	8	5	7	

UNC in areas of energy conversion and transportation. Alternately, areas of comparative strength in The UNC may suggest a search for support in health, socio-economic security and agricultural productivity.

Fields of Science:

Within the scientific community of The UNC as with most universities, a general objective is to have research and graduate training capacities in all major fields of science. This goal is pursued because of the uncertain and unpredictable nature of all basic research and much experimental or clinical research. Also, such a goal is pursued to have the research mission complement the resident instruction mission in all major fields of science.

The seven major fields of science include engineering, physical, environmental, mathematics, life, psychology and social. The distribution of total research expenditures by major fields of science in fiscal year 1973 for all UNC institutions was as follows:

Engineering	$ 3.8 million	- 8 percent
Physical	2.2 "	- 5 "
Environmental	1.9 "	- 4 "
Mathematical	2.1 "	- 4 "
Life	27.1 "	- 57 "
Psychology	.7 "	- 2 "
Social	9.6 "	- 20 "

The seven major fields of science contain sub-fields which include chemistry and physics in the physical sciences; mathematics and computer sciences within mathematics; biological, clinical and others in life sciences; and economics, political science, sociology and others within the social sciences. The data

in Table 2.5 characterize the distribution of sponsored research expenditures by sub-fields and by institution in The UNC.

The life sciences are dominated by research in medicine, public health and agriculture. Much of the environmental research is biological in character. Over 60 percent of the research program relates to human health, agricultural productivity and the conservation and use of natural resources.

These data also indicate comparative strengths by institution within The UNC. In summary form these areas of strength are:

ECU - physics, environmental and biological

NCA&T - engineering, economics and sociology

NCCU - education classified as other under social sciences

NCSU - engineering, environmental, mathematics, biological, economics and education

UNC-CH - chemistry, physics, environment, mathematics, life sciences, psychology, economics, sociology, political science, and education.

In relative terms with federal research expenditures to universities, The UNC is above the average in support for life sciences. There is general correspondence with federal expenditures in the mathematical and social sciences. In the other four categories of engineering, physical, environmental, and psychological sciences, the research program at The UNC lags far behind the national allocation of federal resources.

More definitive data for regional and national comparisons of research expenditures by fields of science are expected as the NSF further develops its science indicator series.

Table 2.5: Distribution of Sponsored Research Expenditures by Fields of Science by Institutions within The UNC for Fiscal Year 1973

Fields of Science	The UNC Institutions													
	ASU	ECSU	ECU	NCA&T	NCCU	NCSU	PSU	UNC-A	UNC-CH	UNC-C	UNC-G	UNC-W	WCU	WSSU	TOTAL
	(thousand dollars)														
Engineering				100		3,462			197	7		30			3,796
Physical															
Chemistry			35	67	40	184		16	823	1	27				1,193
Physics			175	14	82	310			485	2	2				1,070
Environmental			121	48		1,072			583	6		60			1,890
Mathematical															
Mathematics		30	1			923	3		1,015	13				8	1,993
Computer						53			129						182
Life															
Biological			149	0		11,302			10,820		10	396	43		22,720
Clinical			14						2,974		52			65	3,105
Other					72				1,111	4	64				1,251
Psychology			4	2	1				680	0	7		5		699
Social															
Economics			1	102		921			975		25		85		2,109
Political			4						327	6	25				362
Sociology			17	106		469			351	7	26			5	981
Other	102	131	76	91	271	2,074			3,115	19	250	51	13		6,193
Total	102	161	597	530	466	20,770	3	16	23,585	65	488	537	146	78	47,544

Sources of Change in Society:

Technology is broadly defined as the use of scientific knowledge to specify ways of doing things in a reproducible manner which relates to machine, biological, social and intellectual forms of technologies. As defined technology encompasses all three basic courses of change in a society; namely, institutional, human resource and technical. These sources of change are further described as follows:

Institutional Change--includes all research focusing on social and intellectual technologies that relate to structural and organizational change in society. Included are governmental systems for public regulation of environmental conservation, achieving economic stability, redistributing incomes and achieving international stability. Other institutional type changes relate to organizational and social processes such as adult educational systems, a social security system, inter-university and government-university research institutions and others.

Human Change--includes all research relating to improvement of the quality and productivity of human resources. The major focus is on health and educational relationships but the category also encompasses research on safety, population, group alienation, changing values, and resolve of international conflict.

Technical Change--includes all research concerned with the organization of resources into highly efficient systems of production. The major types of technical changes relate to biological and physical or machine/tool technologies that result in reductions in effort and costs in providing goods and services.

With this very aggregate research classification one would expect greater balance by categories. However, the distribution in 1973 by percentage of expenditures was as follows:

Institution change	- 16 percent
Human Resource change	- 42 percent
Technical change	- 42 percent

As with other research classifications, the research program was dominated by activities relating to human resource development and particularly by biological and clinical related studies. Technical type change was dominated by biological technologies relating to plant, animal and natural resources (see Table 2.6).

Research Institute Classification:

As noted earlier more than $27 million was expended upon sponsored research through inter and intrainstitutional research institutes in 1973. This level of expenditure was almost twice what such institutes expended in 1968. The total number of institutes increased from 26 in 1968 to 41 in 1973.

For 1973 the eight interinstitutional institutes including the agricultural experiment station expended some $14,7 million. The thirty-three intrainstitutional research institutes expended $12.5 million in fiscal 1973.

By priority problem areas research within institutes was dominated by work on agricultural productivity, health and environment--these three areas account for 82 percent of all institute research (see Table 2.7). Four institutes focused on agriculture, eleven on health and seven on environmental research--twenty-two of forty-one focused on these three areas.

The distribution of research within institutes as related to basic sources of change in society was as follows:

Institutional changes	- 15 institutes	- $4.0 million
Human resource development	- 14 institutes	- 8.5 million
Technical changes	- 12 institutes	- 14.7 million

A classification of research expenditures by institutes by fields of science suggests that the life sciences were dominant followed by the social sciences and

Table 2.6: Distribution of Sponsored Research Expenditures Classified by Sources of Societal Change by Institutions of The UNC for Fiscal Period 1973

Institution	Institutional Change	Human Resource Development	Technical		Total
			Mechanical	Biological	
		(thousand dollars)			
ASU	52	50	0	0	102
ECSU	81	50	15	15	161
ECU	34	291	68	204	597
NCA&T	251	54	168	57	530
NCCU	264	104	82	16	466
NCSU	2,590	2,295	4,744	11,141	20,770
PSU	0	0	3	0	3
UNC-A	0	0	16	0	16
UNC-C	35	21	6	3	65
UNC-CH	4,261	16,608	1,425	1,291	23,585
UNC-G	117	342	29	0	488
UNC-W	71	4		462	537
WCU	98	43	5	0	146
WSSU	70	0	8	0	78
Total	7,924	19,862	6,569	13,189	47,544
Percent	16	42	14	28	

Table 2.7: Sponsored Research Within Institutes Classified by Priority Problem Areas at The UNC for Fiscal Periods 1968 and 1973

Priority Problem Areas	1968			1973				
	No.of Institutes		Research Expenditures	No.of Institutes		Research Expenditures		
	Inter	Intra		Inter	Intra	Inter	Intra	Total
			(thousand)				(thousand)	
Adv.Sci & Tech.	1	4	$ 2,100	2	2	$ 306	$ 1,074	$ 1,380
Agr.Productivity	1	2	6,400	1	3	11,800	148	11,948
Energy Conversion							0	0
Transportation	1		110	1	1	920	98	1,018
Indust.Productivity		2	540		2	0	335	335
Health		6	2,400	1	10	0	7,680	7,680
Environment	1	2	460	3	4	1,630	1,059	2,689
Socio-Econ.Security		3	445		7	0	1,270	1,270
Education		2	334		3	0	828	828
Other	—	1	40	—	1	0	8	8
Total	4	22	$12,829	8	33	$14,656	$12,500	$27,156

then environmental sciences (see Table 2.8). Fourteen institutes expended more than $20 million in the life sciences, thirteen other institutes accounted for $2.6 million in the social sciences and seven institutes focusing on environmental issues expended $2.4 million--these thirty-four institutes accounted for more than 90 percent of total research expenditures by institutes.

Table 2.8: Sponsored Research within Institutes Classified by Fields of Science at The UNC for Fiscal Period 1973

Fields of Science	No. of Institutes		Research Expenditures		
	Inter	Intra	Inter	Intra	Total
			(thousand dollars)		
Engineering		2	0	335	335
Physical Science	1	1	160	436	596
Environmental	3	4	1,187	1,200	2,387
Mathematics	1	1	96	633	729
Life Sciences	2	12	12,400	7,800	20,200
Psychology		1		339	339
Social Sciences	1	12	813	1,747	2,560
Total	8	33	14,656	12,500	27,156

Section III: RESEARCH INSTITUTES

The research mission of The UNC is implemented through two major organizational entities. A mode is the historically dominant research professor organized within an academic department. The other is a research professor organized within a task or functional entity variously structured and labeled.

Within The UNC, this latter nondepartmental research structure includes institutes, centers, programs, laboratories, stations, consortia and councils. Such entities are relatively new to university structure and decision making processes. Their growth can likely be traced to research entrepreneurship seeking new means to relate university expertise to the increased complexity of technological change and the desire to relate to the synthesis of knowledge essential to the resolution of complex societal problems. Further, these new organizational arrangements, which are separately budgeted, have been designed:

1. To respond to the demands of society for a concentration of research effort directed towards the solution of major problems;

2. To foster the creation of new disciplines and be catalytic to blending disciplines usually required to address all aspects of complex priority problems;

3. To provide the framework for effective utilization of specialized research talents corresponding to the technological development of societal functions;

4. To enhance the linkage of basic and applied researchers and constituency groups;

5. To enhance the efficiency of the research process particularly as related to the utilization of research equipment and facilities;

6. To complement existing undergraduate, professional and graduate training programs.

The principal functions of institutes relate to coordination and promotion of research efficiency. These functions are performed by the blending of highly specialized research talent, the search for support, overcoming the public suspicion and aloofness of the science community and the channeling of research resources to meet societal concerns. Further, coordination has been sought through the development of interdisciplinary, multiple disciplinary and cross disciplinary research teams. Interdisciplinary research implies truly joint and continuously integrated research conducted by experts with varying academic backgrounds--jointly produced papers, reports, and graduate students tend to obscure the specific contribution of each researcher. Multiple disciplinary research involves researchers from numerous disciplines working independently on different aspects of a common problem--the products of this research are reports, papers and students that do not lose disciplinary identity. Cross-disciplining research usually relates to the spin-off of a new discipline--greater specialization--brought about through the elaboration of conceptual and methodological elements.

This change in university organizational structure represents the first substantive challenge to departmental authority in university administration within the last hundred years. Such a challenge has created a range of problems that include issues on tenure, promotion, continued dominance of the resident instruction mission, growing permanency of a problem type organization versus the historically based discipline structure and the issue of advocacy as related to the University's development and implementation of policies and programs designed to address complex societal problems.

This section on research institutes is an initial stock taking of the form, scope, growth and issues that relate to institutes in The UNC. The reported data have been compiled from a questionnaire completed by directors of UNC institutes,

personal interviews with institute directors, and secondary sources. The section concludes with a series of research management suggestions related to research institutes.

Institute Population and Scope

In 1963 there were two interinstitutional and fourteen intrainstitutional institutes with major research programs. In response to societal needs, consequences of technological change and shifts in federal funding requirements, the population of interinstitutional institutes has increased four times and intrainstitutional entities have increased from 14 to 37 (see Table 3.1):

Table 3.1: Distribution of Inter and Intrainstitutional Research Institutes in The UNC for Selected Fiscal Periods

UNC	1963		1968		1973		1974	
Institution	Inter*	Intra	Inter	Intra	Inter	Intra	Inter	Intra
ECU	0	0	0	0	0	1	0	1
NCA&T	0	0	0	1	0	3	0	3
NCCU	0	0	0	1	0	2	0	2
NCSU	1	5	2	7	3	8	3	12
UNC-C	0	0	0	0	0	1	0	1
UNC-CH	1	9	2	13	5	16	5	16
UNC-W	0	0	0	1	0	1	0	1
WCU	0	0	0	0	0	1	0	1
Total	2	14	4	23	8	33	8	37

*Classified by the location housing the administrative offices.

Interinstitutional institutes are characterized as task or problem area oriented, usually multiple disciplinary involving academic types from more than two UNC institutions working independently but in a coordinated manner on a common problem, separately budgeted, with an administrative setup quite separate from the departmental structure. The location of the administrative unit at NCSU or UNC-CH has been selected in terms of the predominance of expertise, experience, history of entrepreneurship and by legislative decision.

The 1974 population of interinstitutional institutes and the cooperating institutions are:

1. Agricultural Experiment Station...NCSU, UNC-G & NCA&T
2. Highway Safety Research Center...UNC-CH, NCSU
3. Institute of Nutrition...UNC-CH, NCSU, UNC-G
4. Marine Science Council...NCSU, UNC-CH, UNC-W & ECU
5. Triangle Universities Computational Center...UNC-CH, NCSU, Duke
6. Triangle Universities Consortium on Air Pollution...UNC-CH, NCSU
7. Triangle Universities Nuclear Laboratory...UNC-CH, NCSU & Duke
8. Water Resources Research Institute...NCSU, ECU, UNC-CH & UNC-W

The second form of research institutes relates to intrainstitutional organizations. These are characterized as task or problem oriented, interschool and interdepartmental within a school or college, usually more interdisciplinary relating to truly joint involvement of researchers from varying disciplines producing joint products, separately budgeted, and structured with an administrative system partially independent of departmental control.

In 1974 there were 16 such institutes at UNC-CH, 12 at NCSU, three at NCA&T, two at NCCU and one each at ECU, UNC-C, UNC-W and WCU. They are:

ECU:
1. Institute for Coastal & Marine Resources

NCA&T:
1. Institute for Research in Human Resources
2. Manpower Research & Training Center
3. Transportation Institute

NCCU:
1. Minority School Biomedical Support Program
2. Institute of Desegregation

NCSU:
1. Center for Urban Affairs & Community Services
2. Center for Rural Resource Development
3. Southeastern Plant Environment Laboratories
4. Center for Occupational Education
5. Engineering Design Center
6. Engineering Research Services Division
7. Center for Marine & Coastal Studies
8. Furniture Research & Development Application Institute
9. Minerals Research Laboratory
10. Pesticide Residue Research Laboratory
11. Reproductive Physiology Research Laboratory
12. Institute of Statistics

UNC-CH:
1. Carolina Population Center
2. Center for Urban & Regional Studies
3. Child Development Institute
4. Health Services Research Center
5. Institute of Latin American Studies
6. Institute of Marine Sciences
7. Institute of Outdoor Drama
8. Institute for Research in Social Science
9. Materials Research Center
10. L. L. Thurstone Psychometric Laboratory
11. Social Research Section, Division of Health Affairs
12. Research Laboratories of Anthropology
13. Laboratories for Reproductive Biology
14. Institute for Speech & Hearing Sciences
15. Center for Alcoholic Studies
16. Dental Research Center

UNC-C:
1. Institute for Urban Studies & Community Service

UNC-W:
1. Institute of Marine Biomedical Research

WCU:
1. Economic Development Center

Throughout the history of The UNC institutes, the primary stimulus to the chartering of intrainstitutional research institutes has been the foresight and entrepreneurship of faculty and administrators. However, since 1963, federal legislation has been the principal stimulus in creating eleven institutes, state legislation another four, and perceived need by university staff and administrators in creating eight institutes.

The stimulus of federal legislation was the principal factor in chartering six of the eight existing interinstitutional institutes.

Contrary to the view of some critics that such institutes are transitory in character, only one institute has gone defunct during the last ten years while twenty-eight new entities emerged. Those thirteen intrainstitutional institutes with more than a ten year history have had budgetary changes from 1963 to 1968 to 1973 as follows:

declined	- 1 institute
held steady	- 9 institutes
had substantial growth	- 3 institutes

Another twenty-one intrainstitutional institutes with at least a five year history have had budgetary changes between 1968 and 1973 as follows:

declines	- 2 institutes
held steady	- 15 institutes
had substantial growth	- 4 institutes

Research oriented institutes are a dominant component of the total research program of The UNC. In the respective years, institutes accounted for the following percentages of total research expenditures:

1963 - 42 percent
1968 - 44 percent
1973 - 57 percent

Of total research expenditures for The UNC in 1973:

interinstitutional institutes	- 14.7 million
intrainstitutional institutes	- 12.5 million
disciplinary research	- 20.2 million

As shown in Table 3.2, the twenty-four intrainstitutional research institutes at NCSU and UNC-CH account for two-fifths of all expenditures on organized research by institutes and about one-fourth of total university expenditures on sponsored research.

While slightly less than half of the research institutes have annual budgets of less than $125,000, there are an equal number with annual budgets in excess of one-half million. There are six institutes with annual budgets in excess of a

Table 3.2: Total and Research Expenditures by Type of Institute for The UNC for Fiscal Years 1963, 1968 & 1973*

Type of Institute	1963			1968			1973		
	No. of Institutes	Total expenditures	Research expenditures	No. of Insts.	Total expenditures	Research expenditures	No. of Insts.	Total expenditures	Research expenditures
		(thousand dollars)			(thousand dollars)			(thousand dollars)	
Intercampus	2	4,514	3,829	4	7,452	7,120	8	15,146	14,656
Intracampus	14	2,284	1,869	22	6,228	5,709	33	17,326	12,500
Total	16	6,798	5,698	26	13,680	12,829	41	32,472	27,156
Intracampus									
NCSU	4	782	581	6	1,683	1,900	8	2,160	1,549
UNC-CH	9	1,487	1,273	13	4,400	3,666	16	13,361	9,825
Other	1	15	15	3	145	143	9	1,805	1,126

*Expenditures for other than research relate to public service functions of research institutes.

million dollars (see Table 3.3).

Table 3.3: Number of Inter and Intrainstitutional Research Institutes Distributed by Size of the Annual Budget for The UNC for Fiscal Year 1973

1973 Budget (dollars)	Number of Institutes	
	Interinstitutional	Intrainstitutional
More than 1,000,000	2	4
500,000 to 1,000,000	3	7
250,000 to 499,999	0	4
125,000 to 249,000	0	5
Less than 125,000	3	13
Total	8	33

While the major stimulus to chartering of institutes was other than federal legislation, the dominant source of research support has been the Federal Government. In 1973 federal sources accounted for 34 and 74 percent of inter and intra-institutional institute support, respectively (see Table 3.4). Support from the State of North Carolina has been predominantly to inter research organizations except that intra institutes at NCSU have consistently received substantial state support.

Administrative Structure

In the absence of a common set of research policies and procedures to guide the management of research institutes, an array of administrative structures have emerged. In 1974 the directors of four interinstitutional institutes were responsible to the vice president for research and public service at UNC-GA for policies issues and on fiscal issues to senior officers at the respective institution. Of the other

Table 3.4: Sources of Support for Selected Inter and Intrainstitutional Research Institutes for The UNC for Fiscal Years 1963, 1968 and 1973

Type and Location of Institutes	Number Included	Federal		State		Other		Total
		Amount	%	Amount	%	Amount	%	Amount
		(000)		(000)		(000)		(000)
Interinstitutional								
1963	2	$ 1,579	36	$ 2,468	55	$ 453	9	$ 4,500
1968	4	2,687	36	3,963	54	850	10	7,500
1973	8	5,200	34	8,200	54	$ 1,700	12	15,100
Total of all Intrainstitutional								
1963	14	1,512	66	648	28	140	6	2,300
1968	22	4,758	76	950	15	492	9	6,200
1973	33	12,702	74	3,266	19	1,332	7	17,300
Intrainstitutional NCSU								
1963	4	419	54	319	41	42	5	780
1968	6	1,128	67	449	27	103	6	1,680
1973	8	1,019	47	993	46	148	7	2,160
Intrainstitutional UNC-CH								
1963	9	1,093	73	314	21	83	6	1,490
1968	13	3,556	81	451	10	393	9	4,400
1973	16	10,556	79	1,774	13	1,070	8	13,400

four interinstitutional institute directors, one reported to a chancellor, another to the provost, one to a school dean and one to a department head for all policy and fiscal issues.

In the case of intrainstitutional institutes, their directors reported as follows:

to University Chancellors	- 15 directors (or Vice Chancellors)
to University Provosts	- 4 directors
to School Deans	- 13 directors
to Department Heads	- 5 directors

This widely varying structure of administrative responsibility has impaired efforts at coordination and likely has prolonged the resolution of issues on promotion and tenure. Recent self-studies at selected UNC institutions have encouraged the standardization of the administrative structure. It has been recommended that interinstitutional, interschool and interdepartmental institutes be made administratively responsible to the senior administrative officer at The UNC-GA and the respective institution.

Another issue is the highly variable administrative committee structure within institutes. There are committees that relate to policy and program content, to reviewing and approving research proposals, to interacting with constituency groups, and to the evaluation of the productivity of research institutes.

Consideration of a more uniform set of committee structures should recognize the diversity among research institutes. Some institutes have institutional granting capacities with varying degrees of freedom. Other institutes have screening and coordinating functions relating to research proposals where final selection is external to the university, while others have responsibilities for presenting a joint institutional proposal to external sources. As related to constituency groups, some have to relate to emerging peer groups independent of established disciplinary peer

organizations, others have advisory councils as part of their administrative system, while others have to relate to constituency groups both internal and external to the university. The diversity of function requires substantial administrative flexibility.

However, it appears desirable to consider greater standardization of essential elements of an institute structure. The most successful institutes, as measured by staff and budgetary growth, have the following structure:

1. An interaction between users and basic researchers
2. An adaptive research group that is close to basic researchers and more directly linked to a constituency group
3. A highly applied or continuing educational oriented group focusing on developmental research and application with user groups, and
4. An articulate and concerned constituency group involved in institute policy and project choices.

Yet another administrative issue relates to the parallel growth of general university research administration and the increasing number of institute administrators. Little evidence exists within The UNC that partial or whole substitition of one administrative group for another has occurred. The growing severity of this issue should encourage the search for alternatives. Some alternatives include the centralization of purchase and accounting functions, experimentation with common administrators across institutes to relate to donors and constituency groups, common administrators across institutes to relate to the academic and continuing education (public service) missions of the university, and the consideration that small intrainstitutional institutes, perhaps in the $150 to $200,000 annual budget class, be administered by existing research administrative officers.

There is an equally wide array of procedures to guide the chartering of

research institutes. These range from review and approval by standing institution wide research committees, to ad hoc committees appointed by deans and chancellors to interactions by university research councils at The UNC-GA, to within school reviews and approvals operating quite independently of The University administrative structure. This process is complicated by the challenges new institutes create with respect to the authority of established departments, indifference on the part of some departmental and school administrators, conflicting desires of federal and state administrators as funding sources, and the desire for apoliticalness on the part of some university administrators.

Presently there are no university policies and procedures for dechartering an institute. With the expectations of tighter funding and the increasing opportunities for replication, this may become a serious management issue.

Institutes and the Professional Staff

In 1973 there were slightly more than 10,000 professional employees within The UNC with 1400 classified with research as a primary function. (See Table 1.7, page 18). In the same year there were slightly more than 700 or 7 percent of the professional staff but 50 percent of the primarily research staff involved with inter and intrainstitutional research institutes. Over the last ten years the proportions are as follows:

Institute staffs as percent of total University staff:	1963 - 10 percent 1968 - 9 percent 1973 - 11 percent
Institute staffs as percent of total University staff classified as primarily research:	1963 - 83 percent 1968 - 50 percent 1973 - 85 percent

These data describe the relatively small share that research institute staffs are of the total university but the significance of research institutes within

the total sponsored research component of The University.

As noted in Table 3.5, there has been an absolute increase since 1963 in the number of professional appointments within institutes that are independent of academic departments. In relative terms such non-academic appointments have accounted for approximately 20 percent over the period 1963 to 1973.

Table 3.5: Nature of Professional Staff Appointments by Types of Institutes for The UNC for Fiscal Years 1963, 1968 & 1973

Type of Institute	Type of Institute Staff		
	Without academic appointment	With academic appointment	Total
	(full-time equivalents)		
Interinstitutional			
1963	56	310	366
1968	46	365	411
1973	84	543	627
Intrainstitutional			
1963	44	77	121
1968	81	156	237
1973	168	356	524
Total			
1963	100	387	487
1968	127	521	648
1973	252	899	1,151

These data raise issues that relate to the administrative independence of institutes from academic departments, increasing concern for research professorship appointments, the quality of institute appointments, the reluctance of some academic types to link with problem oriented institutes and a reason for concern of some faculty over the proliferation of research institutes. An assessment of policies to guide the growth of research institutes should consider these issues.

Institutes and Graduate Students

The distinctively joint products of university research are new knowledge and trained researchers. This classical nature of the output of university research may be in the process of change with the growth of research institutes.

In 1963 with 5,400 graduate and first professional degree students in The UNC, only 217 or 7 percent were involved with the 15 research institutes. Similarly, in 1968 and 1973 graduate and professional degree enrollment was 9,900 and 14,600 but only 610 and 1,030 involved with research institutes respectively. The percent of graduate student involvement with research institutes has remained at 6 to 7 percent since 1963 while a threefold increase has occurred in the number of institutes and while graduate and first professional degree enrollment has doubled (see Table 3.6).

Most interinstitutional institutes with a small share of UNC graduate students do provide financial support for those involved. However, slightly more than half of the graduate students involved with intrainstitutional institutes are financially supported by the institute program.

These data suggest a substantial lack of balance in the research program as related to graduate enrollments and financial support:

	1963	1968	1973
Percent of total research expenditures by institutes	41	37	54
Percent of total professional staff classified within institutes	10	9	11
Percent of graduate student involvement in institutes	6	6	7
Percent of graduate students financially supported by institutes	4	4	4

In 1973, 4,600 graduate and first degree professional students from a total population of 14,600 or 32 percent in The UNC were receiving fellowships, scholarships and assistantships.

Table 3.6: Significance of Research Institutes in Graduate Student Involvement in The UNC for Fiscal Periods 1963, 1968 and 1973.

Year	Total number of graduate students in The UNC	Total number of graduate students working with institute staff	Total number of graduate students financially supported by institutes
1963	5,400	307 (6%)	187 (4%)
1968	10,000	615 (6%)	395 (4%)
1973	14,600	1,029 (7%)	575 (4%)

This stock taking also reveals that research institutes are financially supporting only 4 percent of the graduate enrollment. Descriptive data on this issue over time by type of institute are presented in Table 3.7.

Some probable explanations for this lack of balance and institute participation in a basic mission of the University relate to an array of conditions. The possibility exists that academic departments with large graduate enrollments are not associated with or have not been instrumental in chartering research institutes. Also, that such departments are not focusing on sponsored research training in their graduate programs. Another possibility relates to the appointment of institute staff without academic department affiliation as substitutes for graduate student involvement.

A need exists to explore this graduate student research institute relationship in greater depth. In the planning and evaluation functions of research management, research institutes are a major component as is the training of future researchers. An important impact of research institutes on The University's research mission may be in question and needs further study.

Table 3.7: Number of Graduate Students Involved with and Supported by Research Institute Resources by Type of Institute for The UNC for Fiscal Years 1963, 1968 and 1973.

Type of Institute	Number of Institutes	Number of graduate students working with institute staff	Number of graduate students financially supported by institutes
Interinstitutional			
1963	1	90	90
1968	2	212	207
1973	6	317	315
Intrainstitutional			
1963	14	217	97
1968	23	403	188
1973	33	712	260
Total			
1963	15	307	187
1968	25	615	395
1973	39	1,029	575

Interdisciplinary Research and Institutes

As indicated earlier, a major explanation for the growth of inter and intra-institutional institutes relates to the desire to address crucial problems in an inter or multiple disciplinary manner. Any stock taking of research institutes should assess this issue. However, the available data do not provide for an in depth assessment of the inter, multiple and cross disciplinary nature of research institute programs.

As shown in Table 3.8, research institutes have not been very successful as a catalytic force to inter or multiple disciplinary research. Some 95 percent of the research projects conducted under institute resources in 1973 were conducted either wholly within the institute or jointly with a single academic department.

Table 3.8: Interdisciplinary Character of Some Research Institutes in The UNC in 1973

Item	Interinstitutional Institutes	Intrainstitutional Institutes	Total
Number of institutes	6	31	37
Number of research projects	125	641	766
Number of projects:			
wholly within the institute	5	124	129 (17%)
joint with a department	109	491	600 (78%)
joint with two departments	11	25	36 (5%)
joint with three departments	0	1	1
Number of institutes with projects in:			
0 academic disciplines	1	4	5 (14%)
1-2 academic disciplines	0	15	15 (39%)
3-4 academic disciplines	1	4	5 (14%)
4 academic disciplines	4	8	12 (33%)
Number of institutes with projects in:			
one field of science	1	16	17 (46%)
two fields of science	2	9	11 (31%)
three to four fields of science	2	5	7 (19%)
more than four fields of science	1	1	2 (4%)

Five of 37 institutes had no projects with academic departments, and 15 had projects with one or two departments. However, the remaining 17 had projects with three or more departments.

Twenty institutes have research projects in two or more of the seven major fields of science. However, the remaining 17 institutes have all their projects

within a single field of science.

The Evaluation Function of Management and Research Institutes

As the single most fundamental change in the organization of university research over the last century much has been expected of institutes. Some of the expectations included:

1. A continual and integrated focus on all components of a major societal problem.
2. A means to integrate highly individualistic disciplinarians into inter and multiple disciplinary units.
3. A means to synthesize essential knowledge in the humanities, social, biological and physical sciences in such a manner that the consequences of alternative actions on multiple societal goals were available to decision makers.
4. A means to enhance the conceptual or theoretical base of a problem area.
5. A means to train future researchers in nondisciplinary settings.

There is little evidence that the evaluative function of research administration has been exercised in relation to these expectations or on other issues associated with research institutes. Some of the other issues stem from the proliferation of institute numbers, the financial importance of institutes in university research, and the increasing frequency of faculty requests to resolve departmental-institute conflicts.

At the present time in The UNC, there is no formal set of policies and procedures specifically relating to institute evaluations. The University is aware that some institutes are evaluated annually by administrators of the

institutes, by program reviews of external donors, by constituency committees associated with institutes and in some cases by the highest level of institutional administration. However, to assist in the implementation of a new policy that periodic evaluations be required of all inter and intrainstitutional institutes this section contains an outline of some evaluative criteria. A major source of data for the outline was developed from the institute questionnaire which requested each institute director to assess the general impact of the institute.

Some criteria for a periodic evaluation of inter and intrainstitutional research institutes are outlined below:

1. Teaching Component

   a. extent and form of graduate student involvement
   b. magnitude and form of financial support to graduate students
   c. quantity and quality of revised or new course offerings
   d. quantity and quality of revised or new seminars and workshops
   e. extent that the institute teaching component has minimized or substituted for problem oriented courses in each discipline.

2. Research Component

   a. quantity and quality of publications (refereed journal and technical bulletins, semi-technical papers and reports, and popular papers and reports)
   b. extent institute staff has been cited as contributors to problem area theory, conceptualization and methodology
   c. extent of interdisciplinary coordination
   d. extent of multiple disciplinary coordination
   e. extent of the synthesis of knowledge as it relates to policy or program choices confronting public or private decision makers
   f. form and extent of new processes or products
   g. assessment of the research proposal review and approval process

3. Constituency Component

   a. type of user group involvement
   b. form and extent of user group in program priorities and project selection decisions
   c. assessment of means to reach and involve user groups

4. Professional staff component

   a. quantity of total staff with academic appointments
   b. quantity and explanation for non-academic appointments
   c. evidence of the institute as an attraction to outstanding scholars to join the institution
   d. assessment of the need for research professorships.

5. Administrative Component

   a. extent that institute administration participates in public research or science policy formulation
   b. extent of financial stability
   c. assessment of the sources of financial support
   d. extent of changes in the hard and soft money characteristics of the budget
   e. assessment of changes in the ratio of administrative to professional staff
   f. assessment of budgetary history to support research, public service and resident instruction
   g. extent of the general program and specifically the information program to impact coordination within the institution and between institutions in The UNC
   h. nature and extent of restraints on realization of institute objectives caused by tenure and promotion conflicts with academic departments.

Recommendations

From this initial and necessarily descriptive assessment of The UNC research institutes, four major recommendations are suggested:

1. That research management changes be implemented relating to chartering and dechartering, research proposal review and approval, periodic evaluations, and an information system to enhance coordination.

2. That the administration encourage a more common organizational structure for research institutes and experiment with the general organizational mode of institutes towards greater University capacity for inter and multiple disciplinary units and to improve the capacity of The University to transfer research results to public and private decision makers.

3. That alternatives be studied and implemented that address the growth of parallel administrative structures and the growth of non-academic staff appointments in institutes.
4. That alternatives be studied and implemented to enhance graduate and professional student involvement with research institutes.

Research Management:

The revised research policy statement in this report addresses the suggested changes in research management. The UNC-GA is charged with interinstitutional institute management on chartering as new sponsored research proposals originating from more than one institution are reviewed and approved. General Administration is charged with periodic evaluations of all interinstitutional institutes which should assist management aspects of institute administration. Similarly, The UNC-GA is charged with structuring an information system designed to overcome the knowledge gaps between institutions as an aid to coordination.

The revised policy statement provides that management issues of intrainstitutional institutes be the responsibility of respective institutions. The chancellor or his designated officers are responsible for chartering, review and approval of all research proposals originating from intraschool or interschool sources, and for periodic evaluation of all institutes.

Organizational Structure:

Some research institutes in The UNC are structured as a system involving basic and applied researchers, extension specialists and developmental researchers, and participants from constituency groups. Such institutes have formed multiple disciplinary units, have knowledge dissemination components, have designed

and programmed research projects with direct user group involvement, and have minimal conflict situations with academic departments. Such systematic structures should be studied, the results disseminated to other institute administrators and possibly policies be established towards greater standardization.

The institute structure has assisted in assuring that relevant components of a complex problem have or are being studied. Also, Institute staffs are major resource persons for interfacing with political decision processes. Additional opportunities appear to exist for more formal and continuous interaction with public and private decision makers relating to high priority complex problems. Such action relates to the synthesis of knowledge to structure policy and program options, to estimate the consequences of these alternatives against multiple and usually conflicting societal goals, and to do so with temporal and spatial considerations. It is recommended that the issues and structure for such policy oriented institutes be carefully assessed.

Institute Administration and Staff:

Each new research institute and growth of existing institutes appears to generate another administrative layer with little or no substitution by existing administrative personnel. Also, some evidence is available to suggest absolute increases in non-academic type staff appointments in institutes.

The first issue of parallel growth of administrators raises questions of efficiency. The second issue raises questions of the purpose of the institute to overall University missions and may be a major source of tenure and promotion conflicts.

Further study of these issues is recommended towards the elaboration of policies and procedures to guide research institute management.

Graduate Students:

The data reviewed in this report indicate that a large proportion of the research staff of The UNC is associated with institutes but a very small proportion of the graduate student population is associated with institutes. Is the traditional role of The University to produce both new knowledge and trained researchers being adversely influenced by institutes? Are there conflicting objectives of the institute and The University that tend to a type of research institute staff where graduate student involvement is inappropriate?

It is recommended that further study of these important issues be conducted that could assist policy formulations on issues of chartering, evaluation and the structure of research institutes.

Section IV: RESEARCH POLICY

An explicit statement on research policy and procedure is a necessary component of the research management system of The UNC. The source of data for the policy statement included a review of all formal and informal research policy statements existing in institutions of The UNC, review of statements at other U.S. institutions, and a review of bibliographic material relating to research policy.

Generally the research policy statement provides a rationale for University research, guidelines to research management and criteria for further development of the research program. More explicitly, the policy statement provides guidelines to the planning, implementation and evaluative functions of research management. Planning guidelines include delineation of responsibilities for research policy formulation, ordering of research priorities, an organizational structure for program coordination and structure for continuing investigation to improve research management. The guidelines on implementation relate to preparation, review and approval of proposals; overhead; patents; copyrights; research information systems; and consultation. Administrative guidelines for evaluation are specified to complement peer system and donor processes.

More specifically, research management objectives include:

1. Insuring that research activities are compatible with stated research objectives, concepts of academic excellence and fiscal policies;

2. Insuring that new research programs are compatible with approved programs and long-range plans for The University;

3. Assisting in the design and implementation of a national science policy which would include decisions on the quantity of resources to allocate to research and how to increase the productivity of these scarce resources;

4. Facilitating the optimal allocation of research resources among fields of science, societal problems and sources of societal change;

5. Improving the efficiency of the research function through consideration of such things as economies of scale and complementarities among disciplines. This could include changes in organization and/or spatial allocation of resources;

6. Insuring that government and/or quasi-governmental groups are aware of the benefits of research to the extent that The University programs are adequately supported.

7. Insuring to the extent possible that research is relevant to the needs of decision makers and the results are made available to them.

A basic guideline in the study of research management has been the adherence to a policy of decentralization of the responsibility and authority for the research program. The procedural guides to implementing this policy have been elaborated in the statement. Foremost the statement allocates decision processes to respective institutions by the nature of where proposals originate or whether inter, intrainstitutional or disciplinary in character. The statement provides for a division of labor on substantive and professional review of proposals as well as responsibilities for assessing technical and budgetary management issues.

The success of a highly decentralized research management system will likely depend on:

1. Effective implementation of the policy statement through consistent monitoring,

2. Expansion of an interinstitutional information system on research activities, and the

3. Effective functioning of University-wide research coordinating councils.

The major sections of the policy statement are as follows:

1. Balance of the research and the resident instruction mission of The UNC.

2. Conditions on research as related to the public service mission of The UNC.

3. Guidelines on the chartering, coordination and evaluation of inter and intrainstitutional research institutes.

4. Elaboration of criteria applicable to all sponsored research.

5. Division of responsibility and authority on research proposal review, approval and coordination.

6. Organization and responsibilities of the research management resources including research committees and offices of research administration.

7. Elaboration of overhead and consultation policies as related to the research mission of The UNC.

The policy statement has been extensively reviewed and amended by the technical advisory committee to the study on research management.

The Research Policy of The UNC

The rationale for university research is embedded in the philosophies of education. The most general of these beliefs holds that education is a search for values relating to societal continuity encompassing social justice and order, a pursuit of knowledge to resolve biological and material needs, and to enhance meaning and motivation towards the preservation and improvement of a designated social structure.

The search for a rationale of university research can also be found in the

identity of the principal determinants of growth in a modern society. It is generally agreed that such determinants include human resource development, technical and biological innovation and institutional change.

Whatever rationale is chosen, research in its own right is a major mission and requirement of an outstanding university. The faculty pursues the research mission for varying reasons that range over the following:

1. To better educate the wide array of undergraduate, professional and research resources required by a complex societal structure.

2. To enhance faculty competence through the application of their disciplines to societal problems.

3. To contribute to the resolution of technical, organizational or institutional problems of society.

4. To contribute to the achievement of national purposes as an objective participant and critic.

5. To advance the frontiers of science and fundamental knowledge through basic research.

These objectives are pursued in the conduct of two common forms of scholarly research. Sponsored research includes all forms of organized inquiry that are separately budgeted within the financial system of The University. Unsponsored research is an important form of scholarly inquiry that is not separately budgeted. This latter type contributes to the knowledge system in the form of independently supported investigations in areas not regularly funded by external entities, new books and references, accreditation of new knowledge through the refereeing process, proposal preparation seeking a sponsored status, and in the pursuit of knowledge more directly associated with the resident instruction mission of The University.

Both types of scholarly research include a sequencing of knowledge seeking activities that range from basic to adaptive with the latter subclassified into applied and developmental. The two types are essential to a viable research program and are strongly encouraged.

Research and Resident Instruction

That a spirit of inquiry and a setting for scholarship within The University will complement a strong teaching program is generally not challenged. That two very essential societal establishments, science/technology and graduate training, are inseparable is also widely accepted.

For The University there is constant striving for balance in undergraduate teaching and various forms of scholarly/research-oriented activities. Balance is sought in the sense that some faculty will pursue scholarly and creative efforts without sponsored research support; others will pursue the search for basic and experimental physical, social and biological knowledge within sponsored research programs; others will participate in development oriented sponsored research activities. It is through one of these means that every faculty member is urged to relate undergraduate resident instruction and research.

At the graduate level there are inseparable products of research results and trained scientific manpower. There is also balance in The University in pursuit of these joint products. The continued need for highly disciplined knowledge-oriented research requires that human resources be trained in this manner. There is also need for the research product of utility-oriented research, usually involving multiple disciplinary efforts, and the training of human capital with experience and capacities to work in such settings.

The capacity of The University to participate in applied research on

significant public problems is critically dependent upon the excellence of academic departments. The academic departments provide the professional talent which is continually strengthened by the demands of the disciplinary peer system. Also, the academic department is a source of basic scientific knowledge which is largely unpredictable and its potential utility generally unforeseeable.

The organization to conduct applied research on the other hand is task or functionally oriented unlike the focus of academic departments. Such research may also be short-term and subject to greater funding instabilities unlike academic departments. Applied research requires a linkage with other societal institutions, policy makers and a constituency unlike the requirements of academic departments.

The extent to which professional resources can move between academic departments and applied research organizational units will determine the extent of The University's participation. The flexibility of The University structure and the adaptability of its professional resources relate closely to strong academic departments.

Research and Public Service

The University of North Carolina is an integral component of the North Carolina and United States science community. Participation in research and public service on societal issues of growth, equity and security are sought. However, the conventional notion of resident instruction, research and public service, with the latter denoting involvement in public affairs, is an inadequate conceptual statement.

Public service involves participation in applied research, in adult or continuing education and as a socially responsible entity in public affairs.

In public affairs, The University is involved in developmental processes, in the building of new institutional arrangements, and in the creation of delivery systems for the purpose of problem solving.

Effective public service embraces all three objectives of The University. Also, it is a mission that involves working in a reciprocal way with society.

There are a series of conditions on the research component of the public service function:

1. That The University be restrained to those research and public service areas where it can develop and deliver knowledge.

2. That The University carefully limit itself to research/public service systems that it can sustain on a scale adequate to insure success.

3. That a linkage be established between the constituency group and the research investigator group relating to problem specification, proposal review, decision-maker interaction and application of research results.

4. That the public service function assist in implementing the knowledge dissemination role of The University. This role requires the involvement of university resources in continuing educational activities on issues of public significance.

5. That The University not accept an advocate role. Advocacy is basically inconsistent with the maintenance of academic freedom.

Research and Inter/Intrainstitutional Institutes

The University is continually searching for organizational models that provide for growth in academically-oriented and utility-oriented research. The University of North Carolina is traditionally organized into vertically-oriented departments according to established disciplines. It has emphasized individual

scholarship and research. Much of the research is guided by departmental and disciplinary allegiance.

Within the last few years, new institutes, centers and programs have been structured. Their horizontal organization, usually of a multiple disciplinary mode, are not uniformly defined, their missions are not as consistently implemented as in the case of academic departments, and there are many forms of administrative responsibility. Generally such institutes have developed in response to increased requests for utility-oriented research and to shifts in federal/state funding conditions. Clearly, the creation of such institutes reveals how The University has responded to the need for greater participation in the resolution of significant societal problems.

Towards the partial resolution of the complex allocative and technical decisions relating to institutes, the following policies are being implemented:

1. A council of interinstitutional institute directors should be established with representation from The University Research Council to develop policies and procedures relating to proposal review, approval and continuing evaluation of interinstitutional institutes.

2. All interinstitutional institutes will be approved and evaluated by The UNC-GA through the council of interinstitutional directors to resolve issues of coordination, replication and efficiency in the use of scarce research resources. Also, administrative responsibilities will be assigned to a chancellor and an institution.

3. All intrainstitutional institutes, those of an interdepartmental or interschool nature, will be administratively responsible to the chancellor or his appointed officer.

4. All inter and intrainstitutional institutes should contain a graduate, professional or continuing education training component.

5. An informational system will be established at The UNC-GA that serves to describe the functions, scope and contributions of inter and intrainstitutional institutes.

6. An evaluation of all inter and intrainstitutional institutes will be conducted at intervals of five years. The evaluation should assess the total program of the institute, consistency of program elements, its impact on The University missions, its dependency on a University affiliation and the adequacy of its research policies and procedures.

7. Experimentation should be continued in pursuit of institute research organizational structures that better serve to relate scarce University resources to societal needs.

Criteria Applicable to Sponsored Research

All proposals for sponsored research should meet the following criteria:

1. All research proposals must be rigorously designed and programmed to meet the challenging tests of academic excellence.

2. The research should in most cases augment the resident and continuing educational programs of The University by providing opportunities for graduate and undergraduate training.

3. The primary goal of the research should be contributions to knowledge although new products, processes and strategies may also result.

4. Research designed primarily to test and evaluate new products or processes beyond the pilot stage should be avoided.

5. All research proposals originating in academic departments should be

reviewed under peer procedures established by the academic department.

6. All research proposals originating in institutes should be reviewed by procedures established by the administrator to whom the institute reports.

7. All research proposals must be free of restraints on the dissemination of results with publication rights fully assured to the investigator and The University.

8. Research proposals cannot be accepted for support of security classified research except under extraordinary conditions determined by special review of the Board of Governors.

9. No research proposals should be considered whose purpose and the character of whose sponsorship cannot be publicly disclosed.

10. Research facilities should be available or provisions made for funds to make facility and equipment available.

11. The terms of any research contract must permit The University to exercise administrative control and responsibility for the work.

12. The research budget must be adequate for the proposed work and time span recognizing contingencies. The budget should attempt to reimburse all direct and indirect costs associated with the research.

Review, Approval and Coordination

The process of review, approval and coordination is sequential, involving the investigator, department, school, institution and, where appropriate, The University General Administration.

Generally, a researchable idea is technically reviewed in informal discussions, seminars and workshops at the department level; by deans, research administrators and standing or ad hoc committees at other levels. At issue in the early stage of

the process are conceptual and methodological elements, significance, relation to existing knowledge, and the realism of the plan of work. There are issues of its consistency with University policies, its rank in order of priority, its complementarity to existing research programs and faculty enthusiasm for the idea. A set of administrative issues relate to adequacy of time phasing, budgetary completeness, human subject and safety, continuing human or facility commitment of The University, provisions for indirect costs, and cost sharing requirements.

A major function of research management relates to coordination--the harmonious adjustment or functioning of the research program with respect to duplication of purpose and the use of scarce research resources. Coordination requires examination of programs as a whole rather than just the incremental increases associated with specified projects. A program rather than a project approach addresses whether each project is additional and optimal. Program type coordination can also enhance dialogues between professional staffs and administrators when knowledge is disseminated on specific coordination and technical responsibilities.

The process of coordination involving duplication, efficiency and program functions also addresses opportunities for new program areas, why and where they should be assigned, and what organizational changes are needed to enhance the responsiveness of University research resources to state and national needs.

The following procedures are to be followed regarding sponsored research:

1. All applications for sponsorship, renewal or expansion of sponsored research within The UNC, with funds from an outside source, but administered by The University, should be reviewed with respect to:

a. Satisfactory concurrence with all applicable criteria to sponsored

research.

b. Concurrence that the proposed project is consistent with University policy on additional personnel, space, alterations of facilities, installation and maintenance of equipment, continuing obligations, released time, overhead policy, completeness of the budget estimate, and contingencies.

c. Concurrence that the proposed project is consistent with the policies of sponsoring agencies.

d. Concurrence that the conditions on University administrative responsibility, publication and patent rights are satisfactory.

2. All proposals originating in an academic department and intradepartmental in objectives and scope should be reviewed with the departmental staff and approved by the department chairman. Subsequent approval by the dean of the school or college must be obtained. Proposals are then submitted to the office of the chancellor or his designated administrative officer for final review and approval. Then proposals are returned to the originating source for transmittal to the outside agency.

3. All proposals originating from more than one department and/or from more than one school within an institution are to be reviewed and approved by all relevant department chairmen, deans, and directors of intrainstitutional institutes. Proposals are then submitted to the office of the chancellor or his designated administrative officer who then decides whether additional institutional wide review and approval is necessary. Upon final approval by the chancellor, proposals are returned to the originating source for transmittal to the outside agency.

4. All proposals originating from more than one institution of The UNC or designed and programmed cooperatively with a UNC institution and a non-UNC university or other agency are to be reviewed and approved by The UNC-GA.

Prior to the final review and approval at The UNC-GA, all such interinstitutional proposals are to be approved by relevant department chairmen, deans, institute directors and chancellors or their designated administrative officers. To enhance program coordination, the University Research Council most closely identified with the objectives and scope of the activity will submit recommendations to The UNC-GA. The president or his designated administrative officer will give final approval and return the proposal to the originating institution for transmittal to the outside source.

Though the General Administration prior approval is not required for all proposals, it does require copies of all proposals at the time of submission. Where matters of important University policy arise, the General Administration may recommend to the chancellor involved their modification or withdrawal. Where either seems likely, prior and timely consultation with the General Administration is highly desirable.

5. When a proposal has been accepted by an external funding entity and a grant or contract has been signed by The UNC, there cannot be a premature cancellation of such a grant or contract without prior approval. When such a condition is contemplated, review and approval by the research administration at the institution and by The UNC-GA is required.

These review, approval and coordination procedures are not to be construed as limiting the freedom to discuss possible sponsorship on an informal basis with outside individuals or institutions.

Research Committees

1. Each institution will be requested to establish appropriate research administrative channels which could include a standing research committee or

ad hoc committees appointed by the chancellor or his designated officer. The principal responsibilities are review and approval of intrainstitutional research proposals, review and recommendations on changes in research policies and procedures, recommendations on research priorities, recommendations on awards of faculty research and development funds, and the development of long term plans for research.

2. Each institution will have a committee or committees appointed by the chancellor on the use of human subjects. This committee will assure that appropriate policies, procedures and facilities will be provided which respect the "right to privacy" of the individual and protect him against stress or injury.

3. Those institutions employing laboratory animals and radiation in research activities will have appropriate committees appointed by the chancellor. The committee on laboratory animals will assure commitment to high standards as expressed in the codes guiding animal use and care adopted by the DHEW and USDA. The committee on radiation will establish policies and procedures to assure that all reasonable precautions have been taken to avoid any potential health or safety hazards.

4. Each institution will have a patent committee appointed by the chancellor. The committee will develop policies and procedures to appraise relative rights and equities of all concerned, to facilitate patent applications, licensing, equitable distribution of royalties, to provide a uniform procedure, and to serve the public benefit and interest.

Research Administrative Offices

The research administrative offices are responsible for the broad management functions of planning, implementation and evaluation. In the pursuit of

these responsibilities a highly decentralized management system is preferred. Such a decentralized system should promote diversity which yields increased output, encourage voluntary interactions that serve the end of coordination, and encourage specialization by close proximity to the decision site. Towards a decentralized research management system, the following division of labor is proposed.

General Administration

The research administrative office at the general administrative level of The UNC is responsible for:

1. Continual development of The University's research rationale and participation in the formulation of state and national science and research policy.

2. Continual development, communication and monitoring of policies and procedures relating to all sponsored programs.

3. Technical review and approval of all research proposals originated by professionals from more than one institution that involve interinstitutional research organizations.

4. Establishment of an informational system to complement liaison activities with granting and contracting agencies, to enhance communication among investigators and directors of institutes, and to meet accountability needs with the general public and government officials.

5. Compliance with state clearinghouse regulations.

6. Review and approval of all premature cancellations of sponsored research grants or contracts that were properly authorized.

7. Coordination of interinstitutional research councils that are responsible for the development of policies and of procedures to guide such development.

8. Conduct periodic evaluation of all interinstitutional research organizations.

9. Conduct research on management issues relating to spatial allocation of research activities, enhanced measurement of research priorities and opportunities, and continuing efforts to improve research management.

10. Initiate a program to link established offices of research administration to other institutions for purposes of improving the informational base on sources of support, to enhance the quality of proposals, and to facilitate the implementation of general policies and procedures.

11. Develop an experimental program that would link experienced investigators by discipline or problem area, with younger staff members within The UNC. Major objectives would be to enhance the quality of proposals, to develop jointly designed proposals, and to develop an inventory of human research resources.

Individual Institutions

Each institution will have an administrative officer, but a separate research administrative office will be established only when overhead receipts from sponsored research are adequate to finance the entity or when the volume of proposals is sufficient to clearly warrant such an office.

These officers or offices will have responsibility for:

1. Continual development of the institution's research rationale and participation in the formulation of state and national science and research policy.

2. Administrative approval of all sponsored research applications.

3. Coordination of sponsored programs within the institution.

4. Establishment of informational and liaison functions with granting or contracting agencies.

5. Review and approval of all premature cancellations of sponsored research grants or contracts that were properly authorized.

6. Coordination of appropriate officers for the periodic evaluations of all intrainstitutional research organizations.

7. Establishment of informational and liaison functions with constituency groups related to sponsored research.

8. Preparation of periodic reports of all sponsored activities.

9. Periodic review and dissemination of changes in sponsored research policies and review of research opportunities with representatives of the academic departments.

10. Liaison with The UNC-GA on all matters of research policy and procedures.

Overhead Policy

The UNC policy governing the management of indirect costs (overhead) has two components. The first relates to policies and procedures covering the accounting and informational systems essential to establishing and defending overhead rate calculations. The second relates to policies and procedures on the allocation of receipts arising from sponsored research.

Indirect costs are those that have been incurred for common or joint objectives and therefore cannot be identified specifically with a particular research project. The overhead cost rate is the ratio between an institution's total indirect costs and some direct cost base, usually direct salaries and wages.

Federal regulations require all universities engaging in federally sponsored research to submit annually an overhead or indirect cost proposal. Those UNC institutions where total direct costs, in a fiscal year, of all federally supported work under research and educational service agreements does not exceed one million dollars are allowed to use a simplified method of rate determination; where the level of federally supported work exceeds one million dollars the regular method of rate determination is required. In the latter case indirect cost measurement and allocation should be treated as an independent process designed to facilitate management control of university operations.

Under both methods of rate determination, rate proposals are developed and then negotiated with federal agencies. Rate procedures must give results that are equitable to both the institution and government. Particularly, under the regular method, costs must be associated with human and physical services in an accurate and supportable manner.

In the preparation of a regular overhead rate proposal, a series of cost schedules relevant to research are developed. Detailed instructions are available for rate proposal preparation but generally indirect cost schedules are developed from accounting records and supported by statistical studies in the following areas:

1. General administrative costs based on total current fund expenditures that serve all missions of The University. A time allocation system is developed to estimate the equitable portion for organized research.

2. Departmental administrative costs for organized research are salary portions based on accounting records and time allocation studies and the cost of other research services provided by the department which cannot be directly identified with specific research projects.

3. Research administrative costs are those incurred by a separate organized entity to manage research activities relating to professional, technical and fiscal matters of grants and contracts; personnel administration; refereeing, editing and publishing of research reports; and provision of research services not identifiable with a specific research project.

4. Building and equipment costs are based on a fixed use charge or as depreciation over an estimated useful life. Space assignment and utilization records along with accounting records are maintained to allocate use or depreciation costs.

5. Plant maintenance and operations costs are supportable by accounting records and by data on the intensity of use as related to research.

6. Student service costs are apportioned on a classification of the population served or based on the amount of student employment in the research mission.

7. Library costs are identified by isolating the type and amount of support provided research related faculty.

For allocations of receipts arising from sponsored research the following apply:

1. There shall be maintained at each campus a Special Fund titled "Overhead Receipts Special Fund," each such fund to be identified by an appropriate budget code number. Into these State Special Funds there shall be deposited, not less than quarterly, the sums earned and collected by these institutions as overhead allowances under the provisions of the contracts and grants to which these institutions and/or their employees or subdivisions are parties.

2. Not less than quarterly, there shall be paid from these funds, to the appropriate General Fund operating budgets of the campus, amounts equal to thirty percent (30%) of the receipts realized under the provisions above. These amounts paid over shall be for general support of the operating budgets of the institutions, without reference to particular items of expenditure, and shall be considered general compensation and reimbursement for expenditures under such budgets in connection with the programs and work related to the contracts and grants from which the overhead allowance receipts are originally derived.

3. In addition to the amounts stipulated above, the Overhead Receipts Special Funds shall support (a) any expenses directly related, but not provided for as direct costs, to the programs and work for which the overhead allowance receipts are collected, and (b) all expenditures of a continuing nature, not directly related to contract and grant work, which were originally authorized at the request of the institution to be financed by the use of overhead allowance receipts.

4. The amount of receipts remaining in the Special Funds after the payments set forth in Paragraphs 2 and 3 are made shall be discretionary funds to be expended by the campuses subject to the following controls:

a. The balance of receipts remaining in the State Special Funds at the close of a fiscal year shall be carried forward as beginning balances for the succeeding fiscal year.

b. All disbursements of a recurring or continuing nature from the State Special Funds must have the prior authorization, in writing, of the Advisory Budget Commission; provided, however, that where disbursements of a non-recurring nature do not exceed the amount of $10,000, the Secretary of Administration is authorized to act for the Advisory Budget Commission.

Consultation Policy

The professional staff of The UNC are frequently requested to provide consultant services. The requests are usually related to involvement in research and resulting experience on significant problems of society.

A reasonable amount of consulting activity in the faculty member's special field of competence may help to keep him abreast of new developments, may enhance his competence in solving problems in the applications of his special field and thus improve his competence as a teacher or researcher. Such work also frequently makes significant contributions to the economic development of the State. It may or may not involve extra compensation to the individual or to The University. In certain programs of The University, advice and service to individuals, organizations, and other agencies are an integral part of the staff member's regular duties for which additional compensation would be inappropriate. Under no circumstances should a UNC faculty member participate as a private consultant in such a way as to involve him/her in a conflict of interest. When the possibility of a conflict exists,resolution should be sought with appropriate superiors.

In general, The UNC relies on its professional staff to exercise good judgement and integrity in respondiag to requests for consulting appointments. The following general guidelines identify appropriate criteria:

1. Consulting activities which enhance the faculty member's value as a teacher or researcher and which are related to the missions of The University are considered appropriate.

2. A consulting obligation should be undertaken only if it does not interfere with full and complete performance of the regular duties to which a faculty member has been assigned, for which he is receiving compensation from The UNC and which is normally expected of full time faculty members.

3. Duties which a staff member should reasonably be expected to perform as a public service by virtue of his position on the faculty should be carried out without extra compensation.

4. In keeping with the exercise of high levels of professional integrity, faculty members undertaking positions as consultants must in no way compromise the position of The University through their consulting activities. Both the fact and the semblance of a conflict of interest must be avoided.

5. If a request for assistance involves the substantial use of The University's labor, facilities, or equipment, it should be performed on a contractual basis with The University rather than on a consulting basis with an individual faculty member.

6. When a faculty member works in a private capacity, he should make it clear to those who employ him that his work is private and unofficial. The specific arrangements and compensation rates for such consultation should not subject other professional persons outside The University to unfair competition.

7. The department head or other appropriate person must be informed in advance of accepting a consulting assignment as a basis for improving understanding and communication and for avoiding inappropriate consulting responsibilities. It shall be the responsibility of the chancellors to exercise the necessary control and supervision of consulting activities. At the end of each calendar month, each faculty member shall inform his dean, through his department head, of the amount of time spent in consulting during the previous month. The dean will report to the chancellor.

Section V: SPONSORED RESEARCH AND INDIRECT COSTS

Indirect costs are defined as those incurred for common or joint purposes relating to more than one cost element and not readily assignable. The overhead cost rate is the ratio between an institution's total indirect research costs and a direct research cost base, usually research related salaries and wages.

The research related indirect cost elements include general university administration, departmental administration, research administration, operations and maintenance, research buildings and equipment, library research related student services, research proposal preparation, and state supported management services. Overhead rates are developed from extensive accounting records and supportive studies of time and use allocations. Rate proposals are prepared annually by the institution, negotiated with a federal agency and approved for a specified period.

Even though an institution's indirect cost rate on sponsored research is approved by federal negotiations, the final indirect cost recovery may be less. The institutional rate is approved by a single federal agency. However, individual researchers will finalize research grants and contracts with a large number of federal agencies. The basic institutional rate is used in the initial research proposal, but specific funding for a federal agency may place a limit on overhead rates, or budgetary restraints within a federal agency may require a downward negotiation for a specific research proposal.

Indirect cost or overhead rates are developed at all universities that work on federal grants and contracts and are distinct for research and training awards. A selected number of non-profit agencies supporting university research and training activities allow for some indirect cost recovery. On most educational service agreements or training grants with federal agencies, allowable overhead

rates are substantially less than for sponsored research. Many federal educational service agreements have an upper limit of less than ten percent.

Overhead rates at major U.S. universities for sponsored research vary widely; rates range from less than 20 percent to more than 90 percent for on-campus research activities. Off-campus overhead rates--for international contracts or special off-campus but domestic activities--usually range from one-third to one-half of on-campus rates.[4] Variations in overhead rates are expected between institutions. Some of these variations are related to the size of the graduate school program, the completeness of accounting and supporting informational systems, varying types of research emphasis with different facility and equipment requirements, variations in administrative and accounting structure, the type of federal sponsor where some permit direct costing of allowable indirect cost elements, and to differences in the emphasis placed on rate proposal preparation.

There are a series of research management issues associated with indirect costs. Some of the issues are:

1. The implementation or rate determination procedures,

2. The adequacy of supporting studies, documentations and accounting data,

3. The lack of clarity on reimbursement or allocation policies; particularly amounts used in the general fund of an institution versus more restricted allocations to the fixed costs components of research facilities and equipment, research administrative expenses and as support for budgetary contingencies,

4. The advisability of allocating some indirect cost recoveries to research institute administration, for research proposal preparation and for research services at the school or departmental levels,

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[4]American Council on Education, "Variations in Research Indirect Cost Rates - A Study of Six Universities," unpublished report, Feb. 1969.

5. The impact of high rates on the competitive grantsmanship position of university researchers,

6. The impact of continual revisions of federal policies and procedures.

This section will address some of these issues by focusing on three broad areas:

1. Description of the indirect cost rates operative throughout The UNC.

2. Description of reimbursement history and a review of established policies and procedures relating to allocation of overhead receipts.

3. Evaluation of the opportunities for adjusting informational and accounting data bases at NCSU and UNC-CH that could impact overhead rates and as a data source for elaborating more complete overhead rate systems at other UNC institutions.

The data base for appraising these three areas has been compiled from various sources. These include audit reports, reports of a special inquiry of The UNC-GA, literature review, and personal interviews.

Overhead Rates

Indirect cost rates are developed under two procedures in The UNC:

1. Under a simplified method when total direct costs of all federally supported research and educational service agreements do not exceed one million dollars annually.

2, Under a detailed procedure requiring time and effort, space, and utilization allocations for all costs with joint purposes.

All but two institutions (NCSU and UNC-CH) in The UNC use the simplified method. For those institutions using the simplified procedures the approved rates for 1973 range from 31.04 to 63.46 percent for all on-campus sponsored research. Many of

these institutions have not established off-campus rates but where established ranged from 20 to 31 percent. A much narrower range of approved rates applies to certain federally supported educational service agreements--such as 8 percent for DHEW and up to 30 percent for other federal agencies.

Another category of overhead rates, for those institutions using simplified procedures, applies to rates requested from non-federal sources. These range from zero to 53 percent (see Table 5.1).

Table 5.1: Summary of Indirect Costs Rates for Sponsored Research by Institution in The UNC for Fiscal Year 1973

Institution	Campus wide rates		Non-Federal
	On-campus	Off-campus	Rates
	(percent)		
ASU	30.50	30.50	30.50
ECSU	63.46	None	None
ECU	31.04	31.04	0 to 31.04
NCA&T	40.20	None	0 to 40.20
NCCU	-	-	8 to 45.0
NCSU	52.00	23.50	0 to 52.00
UNC-A	60.00	None	None
UNC-C	46.00	None	0 to 46.00
UNC-CH	48.13	36.17	0 to 48.13
UNC-G	38.90	None	0 to 38.9
UNC-W	53.00	20.00	0 to 53.0
WCU	29.14	None	29.14

In 1973 UNC-CH had three approved rates for federally sponsored research of 48.13, 36.17 and 48.56 percent for on-campus, off-campus and a multiple rate for the Institute of Marine Science, respectively. The rate for non-federal sponsored research ranged from zero to 48.13 percent with still another rate structure for federally supported training grants that varied from 8 to higher levels. The higher rates were dependent upon the success of individual negotiations.

At NCSU federally supported sponsored research carried approved rates of 52.0 and 23.5 percent for on-campus and off-campus activities in fiscal year 1973. Research supported by non-federal sources had applicable rates of zero to 52 percent. Similar to UNC-CH, federally supported training activities ranged from rates of 8 to higher levels. The rates above 8 percent were dependent upon the success of individual negotiations.

The current rates at both institutions for federally supported sponsored research have risen over the last ten years. These higher rates resulted from rising costs of allowable overhead items, the use of more complete informational and accounting data bases used in rate proposal preparation and successful rate negotiations.

Overhead Costs, Receipts and Disbursements

Overhead receipts for all sponsored research and educational service agreements in The UNC approached six million dollars in fiscal year 1973. Assuming that most of these receipts were research related, then approximately one of every seven federal dollars for UNC research went into overhead.

For 1971 and 1972 total overhead receipts were $4.5 and $4.9 million, respectively. As in 1973, approximately 16 percent of all federal research support for 1971 and 1972 went into the overhead account.

Over the three year period 1971-73 more than 90 percent of the overhead recovery came to UNC-CH and NCSU, reflecting larger graduate student enrollments; extensive health, agricultural and engineering research programs; generally higher rates; and a greater number of specialized research institutes. The distribution of overhead receipts by UNC institutions for selected years is shown in Table 5.2.

Table 5.2: Summary of Indirect Cost Receipts by Institutions in The UNC for Fiscal Periods 1971, 1972 and 1973.

University	Year		
	1971	1972	1973
	(thousand dollars)		
ASU	30	21	20
ECSU	-	5	10
ECU	-	73	95
FSU	-	8	41
NCA&T	90	90	167
NCCU	29	27	68
NCSU	1,200	1,352	1,500
UNC-A	1	1	2
UNC-C	3	5	3
UNG-CH	2,923	3,225	3,952
UNC-G	90	77	53
UNC-W	0	4	14
WCU	67	31	19
WSSU	14	10	20
Total	4,447	4,929	5,964

Source: N. C. Audit Reports and Institutional Survey

The disbursement of overhead recoveries has been a persistent source of irritation to research faculty and administration relationships. Major faculty concerns focus on the use of overhead receipts for other than indirect research costs and a general concern that overhead receipts should serve a more stimulative purpose in enhancing the research mission of The University.

It appears that some of these concerns have been addressed by the Advisory Budget Commission. A disbursement policy that was adopted in 1966 by the Commission and amended in 1971 has guided the expenditure of overhead receipts in The UNC. The major elements of that policy are:

1. That from a special fund at each university (Overhead Receipts Special Fund), not less than quarterly, amounts equal to 30% of the receipts in the fund shall be transferred to the appropriate General Fund operating budgets of each institution.

2. That the overhead receipts fund shall also support (a) any expenses directly related, but not provided for as direct costs, to the program for which the receipts are collected, (b) expenditures of a continuing nature not directly related which were originally authorized at the request of the institution.

3. That receipts remaining in the special fund shall be discretionary funds to be expended by The University providing disbursements of a non-recurring nature do not exceed $10,000 are authorized by the Director of Administration, and that all disbursements of a recurring or continuing nature have approval from the Advisory Budget Commission.

4. That 5 percent of the overhead receipts special fund at NCSU and UNC-CH shall be allocated annually to The UNC-General Administration.

A rigorous interpretation of these guidelines would provide that overhead

receipts be used to cover only the indirect costs of research. These costs include the research portion of administration time (general, departmental and school), depreciation of research facilities and equipment, annual costs of maintenance of facilities and equipment utilized in research (repair, security, housekeeping), library operating costs associated with service to the research staff, student services directly associated with the research program, and that portion of the costs of general administrative services related to the research mission of The University. A detailed and computerized accounting system accompanied by regularized time and effort, and utilization records would likely be required to implement such an interpretation.

A review of recent overhead requests to the budget commission and audit reports by institutions suggest the overhead receipts have been allocated as follows:[5]

1. Support for permanent administrative positions associated with grants and contracts, personnel, accounting, purchasing and general administration.

2. Support for business office personnel in connection with time, space and use allocations and inventory control.

3. Support for renovation, alterations and leasing of facilities for all missions of The University.

4. Support for general plant operations and maintenance.

5. Support for major expenditures to meet unexpected situations that would otherwise have been sought from special contingency and emergency funds.

6. Support to cover some of the operating costs of computation units, experimental farms, initiation of multiple disciplinary research institutes, and

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[5]The lack of detail or the necessity of aggregating institutional accounts in the audit reports makes this source of data less useful than had been expected.

other costs specific to the research program.

The data in Tables 5.3, 5.4 and 5.5 provide a partial description of the relationship between estimates of the indirect cost elements for sponsored research and the disbursements of indirect cost receipts at NCSU and UNC-CH. The size of the total 1973 research program, as measured by annual expenditures, was about equal at the two institutions and in recent years the approved indirect cost rates are within 4 to 5 percentage points. However, the indirect cost receipts at UNC-CH are almost double those at NCSU and the approved estimates of indirect cost elements vary widely between the two institutions. Administrative costs were estimated at $3.6 thousand at UNC-CH and only $.8 thousand at NCSU with substantial variation in departmental and general administrative estimates. The indirect costs relating to operations and maintenance at UNC-CH were almost double those at NCSU.

Some explanation for these substantial differences in indirect cost estimates relates to differences in supporting data bases, to increased levels of direct cost allocation at NCSU reflecting procedural differences by federal agencies, and to variations in the mix of research projects reflecting different administrative, facility and equipment requirements. Further, the UNC-CH procedures, consistent with federal regulations, permit departments to claim research proposal preparation costs as an indirect cost item while this practice is not implemeted at NCSU.

The major explanation for variations in overhead receipts relates to two items; the high level of direct costing of indirect cost elements used by the Agricultural Experiment Station at NCSU and a higher rate of recovery of approved indirect rates by UNC-CH related to differences in federal agencies associating with UNC-CH and the budgetary procedures within these agencies.

Table 5.3: Comparison of Overhead Reimbursements for Fiscal Years 1970, 71, 72 and 73 to Overhead Costs for Fiscal Year 1971 at NCSU

Item	Overhead costs applicable to sponsored research 1971[1]	Overhead reimbursements[2]			
		1970	1971	1972	1973
	(thousand dollars)				
Equipment and Buildings	352	363	67	46	69
Operations and Maintenance	439	210	180	203	450
Library	76	0	0	0	
Administration	771	710	812	804	796
Departmental Research	(206)	(337)	(681)	(460)	(423)
General[3]	(342) (223)	(373)	(131)	(344)	(373)
Total	1,638	1,283	1,059	1,053	1,315
Total Indirect Cost Receipts		1,400	1,200	1,261	1,500

1) Source was the approved overhead rate proposal for FY1971.
2) Source was N.C. Audit Reports which did not permit detailed assignment of disbursements
3) Includes disbursements to UNC-GA and other general administrative items at NCSU.

Table 5.4 Comparison of Overhead Reimbursements for Fiscal Years 1970, 1971 and 1972 to Overhead Costs for Fiscal Year 1972 at UNC-CH

Item	Overhead Costs Applicable to Sponsored Research FY 1972[1]	Overhead Reimbursements[2]		
		1970	1971	1972
	(thousand dollars)			
Equipment and Buildings	262	527	425	82
Operations and Maintenance	806	519	1,653	1,008
Library	140	9	0	0
Administration	3,650	661	1,072	1,613
Departmental	(2,582)	(437)	(831)	(1,339)
Research	(133)	(90)	(91)	(112)
General[3]	(935)	(134)	(150)	(162)
Total	4,858	1,716	3,150	2,703
Total Indirect Cost Receipts		2,596	3,003	3,225

1) Source was the approved overhead rate proposal for FY1972.

2) Source was N.C. audit reports which did not permit detailed assignment of disbursements.

3) Includes disbursements to UNC-GA and other general administrative items at UNC-CH.

Table 5.5: Comparison of Indirect Costs for Research with Reimbursements of Overhead Receipts at NCSU and UNC-CH

Item	NCSU				UNC-CH			
	Indirect costs 1971	Disbursement of overhead receipts			Indirect costs 1972	Disbursement of overhead receipts		
		1970	1971	1972		1970	1971	1972
	(percent)							
Administration	47.0	55.5	76.7	76.5	75.4	38.3	34.1	59.8
Departmental	(12.5)				(53.1)			
Research	(20.8)				(2.7)			
General	(13.7)				(19.6)			
Buildings and Equipment	21.4	28.2	6.3	4.3	5.3	30.7	13.5	3.0
Operations & Maintenance	26.8	16.3	17.0	19.2	16.5	30.2	52.4	37.2
Library	4.8	0	0	0	2.8	0.8	0	0

Prior to assessing the limited data on overhead disbursements two issues are reviewed. Over the last few years total overhead recoveries at both institutions have not equaled the estimated total indirect costs--the recovery rates are 61 percent at UNC-CH and 83 percent at NCSU. Secondly, annual disbursements have not equaled overhead recoveries and modest accruals have occurred in the special overhead receipt funds.

Since 1970 overhead disbursements at NCSU have been quite consistent with estimated levels of indirect cost elements except for reimbursements to the library and equipment/buildings accounts. A more disaggregated data source may show this summary to be in error.

At UNC-CH reimbursements to administrative and library accounts have been consistently below the indirect cost estimates. As indicated above, the inability to

disaggregate audit report data may account for these conditions.

These data and summary statements on overhead estimates and disbursements are not sufficient. Any effort to alter present policies and procedures should follow a more detailed evaluation than was possible in this study. Some questions for further study are discussed below:

1. What alternatives exist in relation to higher rates of overhead recovery with federal agencies?

2. What are the factors associated with an accrual in the special overhead receipt funds?

3. What form of accounting and level of disaggregation of accounts are required for more complete evaluation of overhead disbursements?

4. What are acceptable criteria for utilizing overhead receipts for core staff support in research institutes for program development, for support of released time to prepare research proposals, and for increased departmental support to provide essential research services?

Information and Accounting at NCSU and UNC-CH

A persistent question raised by university administrators and external examiners relates to the adequacy of present overhead rates to permit reasonable coverage of indirect costs of research. This question in turn raises the issue of the adequacy of present policies and procedures in rate proposal preparation and negotiations.

As a first phase action in addressing these questions a special study was subcontracted. The objectives were to assess present procedures relating to estimating indirect cost components, to identify specific changes in estimation procedures, and to estimate costs of designing and implementing possible changes.[6]

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[6]The study was contracted to the firm of Coopers & Lybrand. A copy of their final report can be obtained from The UNC-GA.

The study was conducted at NCSU and UNC-CH, the two UNC institutions presently using detailed rate structuring procedures. It is expected that some findings will be transferable to other UNC institutions that are nearing the one million dollar restraint on the use of simplified rate procedures. These institutions are NCA&T, ECU, NCCU and UNC-G.

Further, it was anticipated that the study results would serve as guidelines to meet expected changes in federal regulations requiring increased detail in supporting studies and documentation. Also, that knowledge of a more complete system would serve as a guide to changes in reimbursement policies.

Special Study Summary

In general terms the adequacy of accounting system detail was affirmed at both institutions. However, the supporting and documentation studies were inadequate for selected indirect cost elements at both institutions with greater deficiencies at NCSU. Other general conclusions related to inadequate personnel and assignment of personnel relating to rate proposal preparation, monitoring of grant and contract terms, and development of activity reports; inadequacies in supporting studies on research related buildings and equipment control systems; essentiality of automated systems at both institutions; inadequacies in the use of indirect cost data in evaluating alternatives to increased efficiency in research management relating to personnel, equipment, buildings and services; and inadequacies in communication with the research staffs on indirect cost policies, procedures, and disbursements as related to services rendered.

The following paragraphs present greater detail on suggested changes at each institution.

At NCSU there are opportunities to improve indirect cost estimations in the

following areas in order of priorities:

1. The provision of supporting studies and documentation on buildings to permit use of depreciation charges as contrasted with use charges. Adequate data exist on new buildings but external appraisers would be needed to assess older buildings for detailed construction and renovation costs.

2. The provision of supporting studies and documentation for an equipment control system. Such data would provide for isolating fixed equipment from the facility account and provide details essential to use of 6 2/3 percent equipment use charge or depreciation based on useful life as contrasted with the present 2 percent use charge for buildings and equipment.

3. The provision of supporting studies and documentation at all levels of administrative activities. Presently there is no activity reporting system for administrative personnel and the subjective estimates are inadequate to meet proposal preparation and audit requirements. Arbitrary rates with little documentation are now used in allocating administrative activities between instruction and research.

4. The provision of supporting studies and documentation relating to plant maintenance and operation costs. These data in conjunction with detailed cost data on labor, materials, and utilities can readily be incorporated into rate proposal preparations and permit use of a weighting factor in allocating these costs to research.

5. More effective monitoring of effort, payroll and other monthly reports for consistency could favorably impact rate proposals.

6. Rate proposal preparation and negotiation will benefit from assignment of a full-time administrative person with secretarial support which will allow analyses

of alternative rate proposals and effective supervision of supporting and documentation studies.

7. Increased flexibility in rate proposal preparation will spin off data on indirect cost factors useful in efforts to improve research management effectiveness. This will likely require new delegation of responsibility and personnel reassignments.

At the UNC-CH there are opportunities in the following areas in order of priorities:

1. The development of supporting and documentation studies relating to the library will provide the data base for weighting faculty, graduate and undergraduate student use.

2. Further implementation is suggested of pilot efforts underway on building details. This change will permit use of depreciation charges as contrasted with use charges.

3. The development of supporting documentation studies for a fixed equipment control system. Such data will allow for isolating fixed equipment from facilities and, as at NCSU, allow use of higher equipment use charges or depreciation based on useful life as contrasted with a lower use charge on buildings.

4. The development of more complete and reconcilable supporting and documentation studies on administrative activity. Presently, annual confirmations are difficult to reconcile with accounting reports in rate proposal preparation. The use of categories by departmental administration, instruction and departmental research, research proposal preparation, organized research, educational service agreements and others is to be encouraged at other institutions.

5. The provision of supporting documentation studies relating to the time and effort allocation of plant maintenance and op ration costs. These data in conjunction with detailed cost data on labor, materials, and utilities can readily be

incorporated into rate proposal preparations.

6. Rate proposal preparation and negotiation will benefit from reassignment of a full time rather than half-time of an administrator. This will allow analyses of alternative rate proposals and improve the supervision of supporting documentation studies.

7. Increased flexibility in rate proposal preparation will spin off data on indirect cost factors useful in efforts to increase efficiency in research management.

The data in Table 5.6 provide more detailed information on the present status of areas affecting overhead rate formulation. The table also provides suggestions on the ten priority areas for change at each institution.

General Recommendations on Overhead Policy

Four broad recommendations are outlined below and elaborated on in this section:

1. That all levels of institutional administration improve faculty knowledge of overhead rate policies, rate proposal preparation and reimbursement decisions.

2. That NCSU and UNC-CH initiate proposals leading to improvements in overhead rate procedures. Further, that greater interaction of contract and grant personnel be structured between NCSU and UNC-CH on rate proposal preparation. Also, that UNC-GA in its continual study of research management initiate linkages of NCSU and UNC-CH personnel with counterparts at NCA&T and ECU in overhead procedures and rate proposal preparation.

3. That further assessment of reimbursement of overhead receipts be made a part of The UNC-GA continual efforts in research management.

4. That research administrative officers reporting to a chancellor extend their functions into the study of indirect cost factors as a further guide to improvements

Table 5.6 Summary of the Adequacy of Overhead Rate Components and Areas for Change at NCSU and UNC-CH

Areas affecting overhead rates	Ranking of present status & priority to change			
	NCSU		UNC-CH	
	Present*	Priority	Present	Priority
General Administration:				
accounting system detail	1		1	
detail on direct cost activities	3	8	1	
time and effort reports	4	4	2	4
rate proposal preparation	3	9	2	
flexibility in rate proposal preparation	4	10	4	8
level of automation	4		4	10
institutional use of overhead data	3		3	9
Departmental Administration:				
accounting system detail	1		1	
time and effort reports	4	5	2	5
Direct Research Administration:				
accounting system detail	1		1	
grant and contract monitoring	3		1	
Research Facilities:				
cost appraisals	4	1	4	2
fixed equipment appraisals	4	2	4	3
Research Equipment:				
control system detail	4	3	1	
Plant Operations:				
use of cost data	3	7	3	7
time activity data	4	6	3	6
Student Services:				
accounting system detail	1		1	
allocation of costs	1		1	
Library:				
cost detail availability	2		4	1
user population detail	2		3	1

* The code:
1 - no modification in current procedures required
2 - basic procedure in effect but modifications required
3 - current procedures inadequate
4 - no procedure now in effect

in research management efficiency.

Communications:

A recent report by the office of state budget reports that there is no record of a case in which recurring expenditures supported from overhead receipts has been assumed by the General Fund. This speaks well of one area of university administration of overhead receipts. However, this impression is not shared widely among university researchers.

Enhancement of information on many components of the overhead system would improve faculty-administration relationships. Minimally an annual news note should include a review of overhead rate policies, status and content of rate proposal preparations and negotiations, and reimbursement decisions.

NCSU and UNC-CH Changes:

Available evidence suggests that improvements in supporting and documentation studies used in conjunction with accounting records will improve indirect costs estimates and can aid rate proposal preparations and negotiations. Specific proposals should be prepared by institutional administrators requesting support for changes in those components where benefits are expected.

In that different components in overhead rate procedures are to be further developed at NCSU and UNC-CH, there is potential efficiency from greater interaction by the respective offices. Similarly, as other institutions within The UNC are required to develop more detailed overhead procedures, interinstitutional linkages should be expanded.

Reimbursement:

Limited evidence suggests that guidelines for reimbursement and actual reimbursement histories are not as consistent as desired. A major opportunity for policy

change may exist by coordinating improved data bases on indirect costs and reimbursements to these indirect cost elements.

Research Administrators:

The present and proposed expansion of data bases on indirect cost behavior provide an opportunity to assess alternatives relating to the implementation function of research management. Data on time and effort of administrators, equipment control systems, library use by faculty status and related documentations allow for a systematic assessment of alternatives. An evaluation of comparative costs may serve to identify opportunities for improved research management without increases in management personnel.

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Appendix Table 1: Distribution of Total Expenditures by Major University Missions by Institutions within The UNC Fiscal Year 1963

Campus	Sponsored Research	Public Service	Instruction & Departmentl. Res.	Other	Total
			(thousand dollars)		
ASU	0	0	1,280	1,920	3,200
ECSU	0	0	363	665	1,028
ECU	0	190	2,355	3,926	6,471
FSU	0	0	361	626	987
NCA&T	145	312	1,696	1,180	3,333
NCSA	-	-	-	-	-
NCCU	0	39	1,217	2	1,258
NCSU	7,980	7,015	7,180	6,696	28,871
PSU	0	0	272	299	571
UNC-A	0	0	179	2	181
UNC-C	-	-	-	-	-
UNC-CH	6,020	1,192	12,810	28,020	48,042
UNC-G	0	27	1,947	2,870	4,844
UNC-W	0	0	348	104	452
WCU	0	93	862	671	1,626
WSSU	0	0	501	665	1,166
TOTAL	14,145	8,868	31,371	47,646	102,030

Appendix Table 2: Distribution of Total Expenditures by Major University Missions by Institutions within The UNC Fiscal Year 1968

Campus	Sponsored Research	Public Service	Instruction & Departmentl.Res.	Other	Total
			(thousand dollars)		
ASU	2	73	935	2,129	5,139
ECSU	0	0	701	934	1,635
ECU	658	284	6,164	7,549	14,655
FSU	0	17	774	584	1,375
NCA&T	126	270	2,689	1,697	4,782
NCSA	0	0	640	584	1,224
NCCU	0	275	2,031	7	2,313
NCSU	14,780	10,177	12,698	14,819	52,474
PSU	0	0	1,011	683	1,694
UNC-A	0	0	594	8	602
UNC-C	0	6	1,493	1,606	3,105
UNC-CH	16,740	1,730	28,843	52,597	99,910
UNC-G	741	75	4,071	1,859	6,746
UNC-W	0	0	821	2,225	3,046
WCU	4	30	2,628	1,519	4,181
WSSU	0	0	1,009	1,690	2,699
TOTAL	33,051	12,937	69,102	90,490	205,580

Appendix Table 3: Distribution of Total Expenditures by Major University Missions by Institutions within The UNC Fiscal Year 1973

Campus	Sponsored Research	Public Service	Instruction & Departmentl.Res.	Other	Total
			(thousand dollars)		
ASU	102	140	6,316	4,300	10,858
ECSU	243	0	1,252	1,076	2,571
ECU	522	497	11,180	9,501	21,700
FSU	0	0	1,300	1,000	2,300
NCA&T	1,412	-	4,300	2,788	8,500
NCSA	0	5	1,241	865	2,111
NCCU	354	-	4,200	846	5,400
NCSU	20,500	19,100	21,000	23,100	83,700
PSU	3	0	1,765	1,155	2,923
UNC-A	16	-	1,082	2	1,100
UNC-C	67	162	5,600	2,771	8,600
UNC-CH	25,630	-	41,500	31,570	98,700
UNC-G	488	218	9,600	6,294	16,600
UNC-W	196	23	2,300	3,281	5,800
WCU	56	-	6,500	4,144	10,700
WSSU	78	-	1,700	4,022	5,800
TOTAL	49,667	20,256	120,836	96,715	287,474